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ABSTRACT

This document details the proceedings of the Sixth Meeting of the Steering Committee of the SEAMEC Regional Centre for Education in Science and Mathematics (RECSAM), convened in Singapore from October 21-24, 1969. The Committee: heard reports on primary science and mathematics planning workshops held in Malaysia; agreed to conduct, in cooperation with UNESCO, a regional pilot study course in chemistry teaching; discussed the employment of permanant center staff; and received reports from the Chairmen of the National Coordinating Committees of member countries on programs which are being developed for the improvement of science and mathematics education in their own countries. Included in the Appendices are: (1) copies of reports and addresses; (2) budget information; (3) program agenda; (4) national program summaries; and (5) a list of participants. (BT)

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REPORT
of
THE SIXTH MEETING OF THE STEERING COMMITTEE SEAMEC REGIONAL CENTRE
for
EDUCATION IN SCIENCE AND MATHEMATICS

Participating Member Countries

INDONESIA MALAYSIA PHILIPPINES SINGAPORE
THAILAND VIETNAM
LAOS

Convened by

the Interim Project Office of the SEAMEC Regional Centre for Education in Science and Mathematics in Penang, Malaysia in collaboration with the Ministry of Education, Singapore

RECSAM
Project Office
Malayan Teachers' College
Penang, Malaysia

21 — 24 October, 1969
Singapore

SE 020 677

P5/SCMS/10

REPORT

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THE SIXTH MEETING OF THE STEERING COMMITTEE

SEAMEC REGIONAL CENTRE

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Project Office
c/o Malayan Teachers' College
Penang, Malaysia

21-24 October, 1969
Singapore

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BACKGROUND INFORMATION ON RECSAM

BACKGROUND INFORMATION ON THE SEAMEC REGIONAL CENTRE FOR EDUCATION IN SCIENCE & MATHEMATICS

A. BRIEF HISTORY:

SEAMES, which is the acronym for "South East Asian Ministers of Education Secretariat", came to life as a result of a meeting of the Ministers of Laos, Malaysia, Philippines, Singapore, South Vietnam and Thailand in Bangkok on November 30, 1965. (Indonesia has subsequently joined the SEAMES). An ad hoc Secretariat was formed in Bangkok in December 1965 and its initial responsibility was to prepare proposals for regional co-operation in selected educational fields.

FEASIBILITY STUDY 1966

During the early part of 1966, SEAMES appointed a Feasibility Team, composed of Dr. W. Eilers, Representative of Asia Foundation, Malaysia, Dr. H. Foncannon of the National Science Foundation, United States of America and Mr. C. C. Little of the Summer Science Institute Programme, USAID/ED, India, to conduct a preliminary study relative to a proposed Regional Centre for Education in Science and Mathematics for South-East Asia. The report of the Feasibility Team was examined at the Technical Workshops held in Kuala Lumpur, Malaysia, in July 1966 and further discussed by a Select Committee of Permanent Secretaries of the Ministries of Education of member countries on 17th to 21st October, 1966, in Bangkok. This proposal, together with nine other proposals, was then presented to the Second Conference of the Ministers of Education held in Manila in November 1966, which Indonesia attended for the first time.

Five regional projects as shown on the next page were approved at this Second Conference, namely the Asian Institute of Technology in Bangkok, Tropical Medical Centres in the member countries, a Regional Centre for Agriculture at Los Banos, Philippines, a Regional English Language Centre at Singapore and a Regional Centre for Education in Science and Mathematics at Penang, Malaysia. *

B. FIRST PRE-PROJECT PHASE - MAY TO DECEMBER 1967

In May 1967, the Steering Committee for the proposed Regional Centre for Education in Science and Mathematics, composed of two delegates from each of the six participating countries, held its First Meeting in Penang, Malaysia. At this First Meeting, the Steering Committee recommended a Budget of US$72,423 to carry out certain pre-project activities to enable it to identify the problems of teaching Science and Mathematics in this region and to prepare a Plan of Operations for the Regional Centre.

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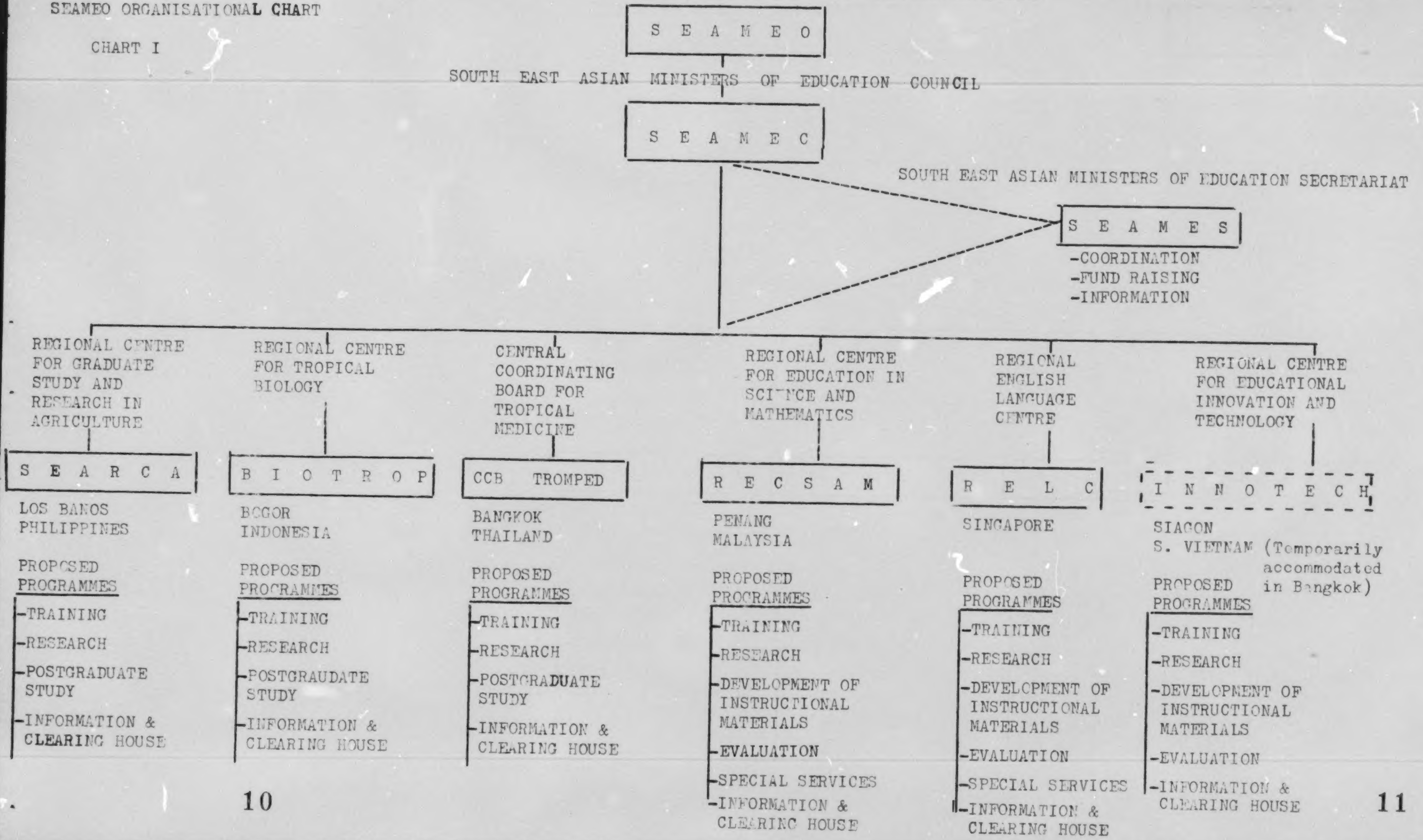
* The Regional Centre for Educational Innovation & Technology at Saigon, Vietnam, was approved subsequently.

THE SOUTH EAST ASIAN MINISTERS OF EDUCATION ORGANISATION

SEAMEO ORGANISATIONAL CHART

CHART I



SEAMEO

SOUTH EAST ASIAN MINISTERS OF EDUCATION COUNCIL

SEAMEC

SOUTH EAST ASIAN MINISTERS OF EDUCATION SECRETARIAT

SEAMES
- COORDINATION
- FUND RAISING
- INFORMATION

REGIONAL CENTRE FOR GRADUATE STUDY AND RESEARCH IN AGRICULTURE

SEARCA

LOS BANOS
PHILIPPINES

PROPOSED PROGRAMMES
- TRAINING
- RESEARCH
- POSTGRADUATE STUDY
- INFORMATION & CLEARING HOUSE

REGIONAL CENTRE FOR TROPICAL BIOLOGY

BIOTROP

BOGOR
INDONESIA

PROPOSED PROGRAMMES
- TRAINING
- RESEARCH
- POSTGRAUDATE STUDY
- INFORMATION & CLEARING HOUSE

CENTRAL COORDINATING BOARD FOR TROPICAL MEDICINE

CCB TROMPED

BANGKOK
THAILAND

PROPOSED PROGRAMMES
- TRAINING
- RESEARCH
- POSTGRADUATE STUDY
- INFORMATION & CLEARING HOUSE

REGIONAL CENTRE FOR EDUCATION IN SCIENCE AND MATHEMATICS

RECSAM

PENANG
MALAYSIA

PROPOSED PROGRAMMES
- TRAINING
- RESEARCH
- DEVELOPMENT OF INSTRUCTIONAL MATERIALS
- EVALUATION
- SPECIAL SERVICES
- INFORMATION & CLEARING HOUSE

REGIONAL ENGLISH LANGUAGE CENTRE

RELC

SINGAPORE

PROPOSED PROGRAMMES
- TRAINING
- RESEARCH
- DEVELOPMENT OF INSTRUCTIONAL MATERIALS
- EVALUATION
- SPECIAL SERVICES
- INFORMATION & CLEARING HOUSE

REGIONAL CENTRE FOR EDUCATIONAL INNOVATION AND TECHNOLOGY

INNOTECH

SIAGON
S. VIETNAM (Temporarily accommodated in Bangkok)

PROPOSED PROGRAMMES
- TRAINING
- RESEARCH
- DEVELOPMENT OF INSTRUCTIONAL MATERIALS
- EVALUATION
- INFORMATION & CLEARING HOUSE

Following upon a request made to the U.S. Government through SEAMES for the necessary funds to carry out these pre-project activities, a letter of agreement was signed on the 30th of June 1967 between the Hon'ble The Minister for Education, Malaysia, and the U.S. Ambassador to Malaysia, approving a budget of US$50,000 towards financing the following pre-project activities of the Regional Centre for the interim phase, July to December 1967:

(i) The First Meeting of the Task Force, composed of top-level educators from the member countries, representing the five subject areas of Biology, Chemistry, Elementary Science, Mathematics and Physics, was held at Singapore from 26th to 27th June, 1967, to draw up guide-lines for National Seminars in Science and Mathematics to be held in all member countries.

(ii) Six National Seminars in Science and Mathematics in the six participating countries were held between July 20 and August 15, 1967.

(iii) A Regional Seminar in Science and Mathematics was held at Penang, Malaysia, from 12th to 15th September, 1967, attended by five delegates from each of the six member countries as well as a number of international consultants to study the reports of the National Seminars and to draw up programme activities for the Regional Centre.

(iv) The Second Meeting of the Task Force was held in Penang from 16th to 19th September to draw up a Draft Plan of Operations for the Regional Centre.

(v) The Second Meeting of the Steering Committee was held in Bandung, Indonesia, from 16th to 19th October to review the Preliminary Draft Development Plan of Operations for the Centre.

At the Second Meeting, the Steering Committee approved the Preliminary Draft Development Plan, prepared by the Interim Project Office, for submission to the Third Conference of Ministers of Education. At the same time, it requested extension of the present interim phase to June 1968 in order to refine the Draft Development Plan and to work out details of the various specific proposals, including Architectural and Engineering Studies.

The Steering Committee agreed on the following broad objectives for the Regional Centre:

> "To help participating countries in improving the teaching of Science and Mathematics in the Region in order to lay the foundations for meeting the technically and scientifically trained manpower requirements of the Region. It is proposed to start initially at the elementary and secondary levels and to involve teacher-training institutions and Colleges of Education, Faculties of Mathematics and Science and other Faculties as may be necessary in implementing the programmes."

It was also agreed that the Regional Centre should not duplicate but instead should complement and supplement the efforts and programmes of existing national, educational, academic and research centres in the member countries. It is vitally important that these national centres develop in parallel with the Regional Centre and gather strength and momentum through close articulation, co-ordination and co-operation with the Regional Centre. Priorities in the programme of the Regional Centre should therefore be given to highly selective activities, which will bring maximum benefit to as many member countries as possible, and which could most economically and efficiently be offered at the Regional Centre. Personnel selected from member countries on completion of their training at the Regional Centre should act as "catalysts" to train the additional personnel required in the various member countries.

SECOND PRE-PROJECT PHASE: JANUARY 1, 1968 - JUNE 30, 1968.

Following upon a request made to the United States Government through SEAMES for the necessary funds to carry out the extended Pre-Project activities, an amendment to the Letter of Agreement dated June 30, 1967 was signed on January 16, 1968 between the Minister of Education, Malaysia and the U.S. Ambassador to Malaysia. Funds amounting to US$39,140 were provided to cover costs of the continued activities of the Centre.

During the months of November and December 1967, January and February 1968 various programme recommendations were received from the Steering Committee and Task Force members, National Co-ordinating Committees and Dr. R.M. Straw, Science Consultant U.S. Peace Corps, Malaysia. As a result of these additional inputs the Project Office sent out to Task Force Members a set of new guidelines, terms of reference, plan of action, and format for writing details of project proposals. The reviewed and refined project proposals prepared by Task Force and support members were then consolidated by the Project Office and distributed to various national groups for their comments and suggestions.

The Third Meeting of the Task Force, assisted by consultants from Australia, Ceylon, United Kingdom and United States, was held at the Malayan Teachers' College, Penang from April 30 - May 3, 1968. At this meeting the refined and revised project proposals were examined on the basis of feasibility and priorities. A programme of activities was recommended for the interim operational phase starting July 1969, for two or three years, and for the full operational phase starting July 1970/1971 for the next five years.

FINAL DEVELOPMENT PLAN - P5/SCMS/14 (2 PARTS)

The RECSAM Development Plan is the basic planning document for the professional work of the Centre. Together with the Government of Malaysia's Funding Plan (RCP.A27(7)) these documents present a 5-year complete picture of Centre professional programmes, management of programmes, staff acquisition, capital development and budgets.

This Final Development Plan went through a number of editions after the preliminary version was developed subsequent to the Task Force Meeting previously noted. The Project Office, with the assistance of Dr. Richard M. Straw of the U.S. Peace Corps, collated the different technical proposals into project abstracts which reflected a functional approach to regional needs rather than a purely subject area one. The essential elements of the original subject area proposal were generally retained however. The Project Office then evolved the rest of the Development Plan, using these project abstracts as the technical base.

The Final Development Plan and the Funding Plan, after extensive review by the Steering Committee, were then submitted to the Fourth SEAMEC Conference in Djakarta in January, 1969 and approved.

These documents will now serve as the basic guidelines for development and funding of the Regional Centre for Education in Science and Mathematics.

PROJECT PROPOSALS OR PROGRAMME OF ACTIVITIES FOR THE FIRST FIVE-YEAR FULL OPERATIONAL PHASE (1ST JULY 1970 - 10TH JUNE 1975)

Specific project proposals have been planned and arranged in order of priority for the first full operational phase. These project proposals are based on the needs of member countries in the region, as expressed in the six National Seminars and one Regional Seminar and evaluation by the Task Force and external consultants. During the first five years, the Regional Centre proposes to offer the following services and courses under the three functional divisions:

1. Training Division

   5 seminars and 43 courses are proposed for the training of 1122 key personnel from the region. The first pilot programme, which involved 20 SEAMEC participants, was held in August 1968 and covered four courses in Integrated Science, Nuffield Biology, Chemistry and Physics.

2. Research - Development - Evaluation Division

   A total of 59 courses for 1152 key personnel are proposed.

3. Information and Special Services Division

   The functions of this division are:

   1) making the expert knowledge of the Centre staff and its consultants available to participating member countries to solve their local problems, and
   2) assuming responsibility for the regional distribution of bulletins and newsletters relating to (i) activities connected with the Centre and its member countries, and (ii) international projects outside the region.

   The following continuous programmes have been planned.

   a) Facilities Consultant Services
   b) Regional Lecture Bureau
   c) Exchange and Fellowship Office
   d) Regional Textbook Project (Prototype)
   e) Regional Journal Project
   f) Regional Newsletter and Bulletin Services - Science & Mathematics Education Materials Bulletin
   g) Regional Science Education Film
   h) Science - Mathematics Library Bibliographic and Abstract Services
   i) Regional Bibliography of Biological Research

PROJECT BUILDING COMPLEX, STAFF AND EQUIPMENT:

Contribution by Malaysia:

The Regional Centre is operating for a period of two years from 1 July 1968 to 30 June 1970 (Interim Phase) with support services and facilities provided by the Malaysian Government through the Malayan Teachers' College at Penang. These facilities include four Science Laboratories (2 Chemistry, 1 Biology, 1 Physics), one Mathematics room and one Audio-Visual Aids laboratory, preparation rooms, workshops, a photographic dark room, a lecture auditorium, and a new library.

Permanent Centre:

The permanent Centre will be built in two phases. During Phase One the first hostel for 60 persons and a dining block (also serving as temporary administration offices and containing some classrooms) will be constructed by November 1969. During Phase Two an administration building, an information and exhibition centre, a library and Audio-Visual Aid (AVA) Centre, two teaching blocks, two additional hostels for 60 persons each (capable of handling 120 on a two person per room basis) a laboratory block, and some staff housing will be constructed. An International House being built by the Penang State Government will accommodate as many as 20 staff members of the Centre. In addition 10 apartments will be available near the site of the Penang Civic Centre, which will contain a large auditorium, several Committee and conference rooms and an exhibition area which could be used by the Centre as needed.

Staffing:

The Centre Staff will consist of the Director, Deputy Director, three Heads of Divisions (Training, Research & Development, and Information & Special Services)* twenty professional officers, a Librarian, and Audio-Visual Aids Specialist and an Information Systems Specialist, staff members, a Registrar and five consultants. There will be eighteen professionals from SEAMEC countries, twelve from Malaysia, two consultants from the U.S. and three from the U.K. The support staff numbering 63 will be both technical and general services personnel.

Equipment:

About two thirds of the equipment and books will be from U.S. sources and a third from Malaysia through prospective world wide donors. This equipment, which will be used to carry out training, research and information programmes, will include office, printing and duplication, science laboratories, prototype apparatus production workshop, and an Audio-Visual Aids unit. Supporting equipment will include a car and a van.

Permanent Five-Year Operational Phase - July 1, 1971 - June 30, 1975

The Funding Plan proposed by the Government of Malaysia for the Permanent Five-Year Operational Phase consists of three major areas:

1) Capital Costs and Equipment amounting to	US$2,830,000
2) Operational Costs amounting to	US$2,800,000
3) Special Funds amounting to	US$2,625,000
Total -	US$8,255,000

The Special Funds will provide for scholarships, travel grants, seminars and conferences, Steering Committee meetings, and national programmes.

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* Special Services and Information will be combined initially; however if demand for Special Services increases substantially, it will be made a separate Division.

PROCEEDINGS

PROCEEDINGS OF THE SIXTH MEETING OF THE STEERING COMMITTEE OCTOBER, 21st - OCTOBER, 24TH, IN SINGAPORE.

OPENING CEREMONY

The Sixth Meeting of the Steering Committee of the Regional Centre for Education in Science and Mathematics was officially opened on Tuesday, 21st October, 1969, at the Ministry of Education, Singapore by the Honourable Inche Mohd. Ghazali bin Ismail, Political Secretary to the Minister for Education, Singapore.

ADDRESSES

Mr. Chin Pin Seng, Acting Chairman of the Steering Committee, Prof. Dr. Soemantri Hardjoprakoso, Acting Director, SEAMES and the Honourable Inche Mohd. Ghazali bin Ismail, Political Secretary to the Minister of Education, Singapore, addressed the Meeting at the Opening Ceremony. Their speeches appear in Appendices 1A, 1B and 1C.

BUSINESS

Before the commencement of the Meeting, a one-minute silence was observed as a mark of respect to the former Chairman of the Steering Committee, the late Mr. J.E.B. Ambrose.

1. ELECTION OF CHAIRMAN

Mr. Chin Pin Seng of Malaysia was unanimously elected Chairman of the Meeting.

2. ADOPTION OF THE AGENDA AND PROGRAMME

Two proposed agenda, an origianl (document P5/SCMS/19) and an amended (document P5/SCMS/19 (I)) were submitted for the Meeting's consideration. The amended agenda excluded Item 10 of the original. The Meeting unanimously accepted the original agenda and programme.

3. REPORT OF THE FIFTH STEERING COMMITTEE HELD AT THE NATIONAL EDUCATIONAL CENTRE, TOKYO, JAPAN - MARCH 31ST TO APRIL 7TH, 1969. (DOCUMENT P5/SCMS/16)

This report was accepted.

4. MATTERS ARISING

Under matters arising Mr. C. Ganasalingam, the Programme Co-ordinator, RECSAM, reported as follows:

4.1. Special Adviser

The late Mr. J.E.B. Ambrose, former Chairman of the Steering Committee had written to Mr. Chang Min Kee regarding the latter's role and function as Special Adviser as decided at the Fifth Meeting of the Steering Committee.

With respect to this letter the Meeting agreed that:

(i) The status of the Special Adviser would be of an honorary nature and advice would be sought through correspondence.

(ii) The Special Adviser should publicize RECSAM and establish suitable contacts for assistance and co-operation for RECSAM;

(iii) The Project Office, on the advice of the Steering Committee would invite Mr. Chang to attend any meeting, should his presence be required.

4.2. Appointment of Information Officer and Training Officer and the Question of International Salary Scales:

4.2.1. Secondment of Mr. C. Ganasalingam, Programme Co-ordinator to RECSAM

Although some verbal assurance had been given by the Government of Malaysia on the question of pension rights and indemnity for Mr. C. Ganasalingam, there had been no positive reply on this matter.

The Chairman informed the Committee that the question of secondment of staff to RECSAM was under active consideration by the Government of Malaysia.

4.2.2. Recruitment of Information Officer and Training Officer

The Project Office had obtained the particulars of salary scales that were being used by SEARCA, AIT, BIOTROP and RELC. From a study of these fields it would seem preferable for RECSAM to work closely with the RELC in spelling out the terms and conditions of appointments of professional staff from:

(i) Member countries
(ii) Outside the Region

4.3. International Advisory Council

Brief Reports on the Pacific Science Association Inter-Congress Meeting and on the Symposium on Science Education were tabled for the meeting and it was decided that they be included in the Annual Report of the Centre.

4.4. Links with National and International Agencies

The Planning Consultant, Mr. T.B. Slattery, wrote to the Radhakrishna Institute of Technology and Administration (RITA), Bangalore, India. Consequently the Programme Co-ordinator paid a visit to the Institute and met Mr. Krishna Murthy the Director, who kindly agreed to give lectures in Management Science at the Senior National Administrators Seminar on his coming visit to RECSAM in March, 1970.

4.5. BSCS Adaptation Course

A separate report of this was to be tabled later under Item 5 of the Agenda. Twenty three participants attended the course and were awarded Certificates of Completion.

4.6. Research RAG-1(a) Project
Comparative Education System - SEAMEO countries

Mrs. D.H. Khoo, a lecturer from the Malayan Teachers' College, Penang, who started working part-time on this project would attend the meeting on Thursday, 23rd October to meet delegates regarding the questionnaire that she had prepared.

4.7. Computer

Important points to be noted were:

4.7.1. US/AID arranged for Dr. Goldhammer's (ECAFE) visit to Kuala Lumpur from 12th to 16th May, 1969, to make a preliminary survey on the needs of a computer. The programme planned, however, was not carried out due to unforseen circumstances.

4.7.2. US/AID could not provide funds for the Centre to carry out the survey.

4.7.3. RECSAM would be given computer time when needed. Under the circumstances, RECSAM arranged with the MARA Institute of Technology, Kuala Lumpur, to negotiate with the firm concerned for the donation of a computer.

4.8. Report on Malaysia's Vacation Courses

This was circulated as a separate report.

4.9. Budget July, 1968 - June 30, 1969.

This would be presented in Item 5 Annual Report of activities of the Project Office.

4.10. Budget for the Interim Centre (Extended Nurturing Period July 1, 1969 - June 30, 1970)

4.10.1. An Agreement was signed between US/AID and the Malaysian Ministry of Education for the release of US$110,000 for the above budget.

4.10.2. An amount of US$20,000, being part of the unspent balance of the previous budget was transferred to the current budget to make up US$130,000, representing the total contribution by the United States Government in addition to US$85,792, being contributed in support of services and in salaries paid by the Government of Malaysia.

4.10.3. The Project Office had already received two-thirds of the first quarter allocation amounting to US$16, 667 for operational expenses in July and August, 1969. The Project Office was now expected to operate its own accounts and submit monthly returns to SEAMES.

4.11. International Advisory Council

4.11.1. The Meeting was informed that Dr. Kakiuchi had accepted the invitation to serve on the International Advisory Council. He visited RECSAM on 9th May, 1969, after attending the Inter-Congress Conference of Pacific Science Association meeting in Kuala Lumpur.

4.11.2. Letters were written to Mr. William Wichmen by Mr. Slattery and the Project Office. Up to date no reply was received. Mr. Slattery would be following this up while in the United States.

4.11.3. Letters were written by the Programme Co-ordinator to Mr. B.C. Sekhar and Prof. Dr. J. Smidt who had both agreed to serve on the International Advisory Council.

4.12. Links with International Agencies

A joint Chemistry Teaching Workshop cum Pilot Study on developing a Chemistry Prototype Syllabus had been planned in co-operation with UNESCO. This would be discussed as a separate item. The Programme Co-ordinator attended the UNESCO Asian Regional Institute for School Building Research (ARISBR) Sub-Regional Conference in Colombo, Ceylon, from 4th to 11th October, 1969. The Programme Co-ordinator recommended at this conference that the design of suitable Science rooms in Primary Schools was a factor which should be given top priority in future plans of ARIBSR as more and more countries in the Asian Region were introducing the teaching of Science at the first level of education.

4.13. National Co-ordinating Committee

Letters were written to Chairman of the National Co-ordinating Committees to provide RECSAM with brief reports on specific programmes in Science and Mathematics education that were being carried out in the respective countries. This would be discussed as a separate item.

4.14. Inter-Regional Project Relationships

4.14.1. Special English Course

Details of this course were to be worked out between RECSAM & RELC and financial and staff provision for this course were to be made in the RECSAM Funding Plan.

4.14.2. Joint BIOTROP Research

Top priority would be given to the writing of a Biology text using Flora and Fauna of the Region. A separate report of the meeting between BIOTROP and RECSAM had been prepared and would be tabled under Item 5.

4.15. Primary Science and Primary Mathematics Planning Workshop

This would be tabled as a separate item in the Agenda.

4.16. Date and Venue for the Sixth Meeting of the Steering Committee

This had been arranged to be held in Singapore from Tuesday 21st to Friday 24th, October, 1969.

4.17. Meeting of Chairmen of National Co-ordinating Committees

The Programme Co-ordinator stated that Chairmen of the National Co-ordinating Committees of Indonesia, Malaysia and Vietnam had not been nominated. When all the Chairmen have been nominated, they could be invited to attend the Seminar for Senior Administrators which was scheduled for March 1970 or for the seventh meeting of the Steering Committee in Penang in May 1970, subject to the availability of funds.

5. ANNUAL REPORT ON THE EVENTS, ACTIVITIES AND FINANCIAL EXPENDITURE OF THE FIRST INTERIM YEAR (NURTURING PERIOD JULY 1st 1968 - June 30th, 1969)

5.1. Statement of Accounts

The Programme Co-ordinator reported that the Centre had purchased a van which would be operational as soon as details regarding the exemption from ad valorem tax had been settled.

5.2. Reports

(a) Integrated Science Course
(b) BSCS Philippines Adaptation Course
(c) Refresher courses in Biology, Chemistry, Physics and Mathematics
(d) Inter-Regional Project Workshop Discussion on the Use of Local Flora and Fauna in the teaching of Biology in Southeast Asian region.

It was pointed out that there was inadequate evaluation and feedback as to the effectiveness of these courses and the meeting decided that some form of proper evaluation be made for each course to assess its usefulness and effectiveness.

5.3. Visits

5.3.1. It was pointed out that reports on the usefulness and the benefits of such visits would be more purposeful than mere accounts for the visits.

5.3.2. To a question regarding the proposed invitation to the Korean Ministry of Education to take part in the RECSAM regional workshop in Primary Science in July 1970, it was considered that it would be more appropriate for the Korean Ministry of Education to write to SEAMES as Korea was not a member nation.

6. SECOND REVISED BUDGET FOR THE INTERIM CENTRE (NURTURING PERIOD) 1ST JULY 1969 - 30TH JUNE 1970

6.1. The second revised budget was accepted after it was agreed to bring up provision under Item 5 to $5,000/- which should include purchase of library books and materials, by reducing Item 4(a) from $6,500/- to $5,300/- and Item 6.1. from $1,760/- to $960/- The Meeting was also informed that the provision under each of the budget items could be exceeded up to 15% provided that the total provision of the budget was not exceeded.

6.2. The Steering Committee confirmed the approved budget and requested the Programme Co-ordinator to draw the attention of the Malaysian Government to the need to study the salary differentials more closely with a view to making adjustments where necessary.

7. REPORTS

7.1. Report of the Primary Science Planning Workshop (Document P5/SCMS/17)

7.1.1. In answer to a query as to why LAOS, a member country, was shown separate from others, the Programme Co-ordinator replied that this was done because Laos had been unable to accept invitations to previous projects. However, in the integrated science course held in August this year Laos participated for the first time. The Steering Committee ruled that Laos, being a member country, should not be treated separately and that funds should be provided in the budget.

7.1.2. With reference to D3(ii) (p. 16A of the report) as to whether part-time staff should be paid per diem as well as honoraria and in view of the precedent it would set not only for RECSAM but for other SEAMEO centres, it was resolved that the payment of honoraria be worked out by SEAMES under "Special Funds". The Programme Co-ordinator was directed to obtain approval from SEAMES for the payment of honoraria for every course the Centre runs, if honoraria for the course were intended to be paid.

7.1.3. With reference to D4b(p.16A of the report) and in order to avoid a top-heavy staffing situation in relation to the number of participants, the Steering Committee decided that the Centre staff should serve as Course Director and Administrative Officers in this and in similar future courses and that specialists be invited to serve as consultants in such courses.

7.2. Report of the Primary Mathematics Planning Workshop (Document P5/SCMS/18)

The report was accepted subject to (a) the two conditions set out in para. 7.1.2. and 7.1.3. as both courses planned were related and would run similtaneously, and (b) the original report as weas corrected.

Mr. C. Ganasalingam and Mr. Aurelio Juele were asked to go through the reports of Primary Science Planning Workshop and Primary Mathematics Planning Workshop with a view to correcting errors under the heading

FINANCIAL CONSIDERATIONS

7.3. Report on the Integrated Science Course Year II (Document P5/SCMS/19)

No evaluation of the Course had been made. It was thus recommended that for future courses evaluation should be made. The Meeting was informed that a research officer would be appointed in July/August to conduct course evaluations.

8. FUTURE OF THE INTERIM STEERING COMMITTEE AND TERMS OF REFERENCE FOR THE PERMANENT "GOVERNMENT BOARD" FOR "ADVISORY COMMITTEE" OR "BOARD OF TRUSTEES". WORKING PAPER PREPARED BY PLANNING CONSULTANT.

With reference to paragraph A of item 8 in paper P5/SCMS/19, it was decided to change the nomenclature from "Steering Committee" to "Governing Board" to be effective when the permanent body was set up in July 1970 and the host country to be duly informed of the change.

9. APPOINTMENT OF CENTRE STAFF

9.1. It was pointed out that the Centre Director would be from the host country and it was emphasised that the procedure was for the host country to nominate candidates for the consideration of the Steering Committee which would in turn make its recommendations to SEAMEC for appointment.

9.2. Reference was made to the appointment of a Centre Director to assume duties on 1.12.69. It was feared that with the limited time available, the Centre Director might not be appointed 1.12.69.

9.3. In view of the limited time, the Programme Co-ordinator was directed to send a letter to the Government of Malaysia urging them to make nomination/s for the post of Centre Director by 21.11.69. A sub-committee of the Steering Committee with one delegate from each member country, given full powers to make decisions on behalf of the Steering Committee would convene an emergency meeting at Bangkok in the first week of December, 1969, to consider the nominations and make recommendations to SEAMEC.

9.4. In the event of the Government of Malaysia not being able to meet the dateline, the Steering Committee recommended that the Government of Malaysia extend the services of Mr. C. Ganasalingam, the Programme Co-ordinator, until the appointment of a Centre Director and also provide interim staff to assist the Programme Co-ordinator. This request, it was stressed, ought to state clearly the urgency of the situation.

9.5. The nominees for the sub-committee to meet in Bangkok to consider nominations for the post of Centre Director were:

Indonesia - Dr. Didin Sastrapradja
Malaysia - Mr. Chin Pin Seng
Philippines - One member to be nominated by the Secretary of Education.
Singapore - Mr. Chan Kai Yau
Thailand - Prof. Dr. Bitat Raksaboldej
Vietnam - Mr. Cao Minh Khai

10. THE PROPOSED CENTRE STAFF JOB DESCRIPTIONS, RULES AND REGULATIONS, ETC.

The Programme Co-ordinator explained that he had prepared the draft working papers helped by the draft of RELC Staff Rules and Regulations in the expectation that these could have been studied by the Government of the host country. As this study had not as yet been done the papers could only be tabled for information and comments.

10.1. Job Descriptions

The expanded Job Description prepared by the Programme Co-ordinator was compared with that in the Development Plan and the Steering Committee agreed to present a revised set of Job Description to the Government of the host country for their information.

10.2. Rules and Regulations (Document RECSAM/SR/2)

The following were some suggestions with regard to Rules and Regulations:

(a) Staff Classifications into Administrative, Professional, Senior and Junior Staff be avoided where possible;

(b) Negative Rules be substituted by positive ones wherever possible;

(c) Staff members be not restricted from making public statements if such statements are likely to enhance the good name of RECSAM; (Ref. Rule D1 p. 9)

(d) That both Federal and State (Penang) holidays be included; (Ref. Rule D7, p. 10)

(e) That the word 'valuable' in 'Valuable Presents' be defined, or, the entire Rule D9 on Gifts be deleted as it was superfluous;

(f) That dismissals of staff appointed by the Director be made by the decision of a staff committee with the Director as Chairman, and dismissals of personnel who have been appointed with the approval and concurrence of the Steering Committee be effected only with the approval and concurrence of the Steering Committee.

10.2.1. The Committee also felt that if possible there should be a uniform set of Staff Rules and Regulations governing all regional centres as there was a likelihood of staff transfers between centres.

10.2.2. It was pointed out that if the permanent centre were to operate in July 1970 as proposed, all legal documents such as Centre Rules and Constitution must be finalised and submitted for approval at the next SEAMEC conference. The host country was to be briefed about the urgency so that a working paper on rules and regulations could be reviewed by the Steering Committee. If these papers could be ready before the Sub-Committee meeting in Bangkok in the first week of December, the sub-committee would be empowered to act on them. However, if they could not be made available in time for the Bangkok meeting, the Steering Committee Meeting fixed for May, 1970, could be advanced for this purpose.

10.2.3. It was also hoped that the Centre Agreement and Constitution which had already been studied be put up at the Project Directors' Meeting in November, 1969.

10.2.4. It was pointed out that the method of computing top-up allowances as given in Annexure IV of Proposed Staff of the Permanent RECSAM 1970 - 75 presented difficulties and that it was anomalous with Rule E2(c) of the Proposed Staff Rules with regard to married and unmarried staff and families. It was suggested that a simpler formula to compute top-up allowances on the lines adopted by RELC would be more suitable.
RELC formula: - Difference of Home Salary
+ Allowances and US$6000/-
subject to a maximum of
US$500/- and minimum of
US$3000/-.

10.2.5. Annexure II(a) Period of Secondment
Annexure V Tour of duty

Reference was made to the contradiction in para(a) of Annexure II which states, inter alia, that the period of secondment should be not less than one year on the one hand and that on the other hand, the Malaysian Government reserves the right to determine the termination of secondment at any time.

10.2.6. It was felt that for the Centre to function smoothly it was important that there be assurance that the Centre staff would not be removed after a short spell of service, as was possible under the present regulations. However, it was strongly felt that for the Centre, a regional project located in a member country, to survice and progress such a clause should be excluded.

10.3. Annexure I of Proposed Staff of Permanent RECSAM 1970-75

10.3.1. A clarification was sought as to why a staff member in the Training Division of the Chemistry Department received an annual salary of M$20,640/- while his counterpart in the other Departments received M$16,800/- each. It was explained that among the Permanent Staff, provision was made for 3 superscale officers from the Malaysian Civil Service and, for convenience, one of these was classified under the Chemistry Department.

10.3.2. There was considerable discussions as to the mechanism for appointing the key personnel to the Centre. It was felt that since the Sub-Committee in Bangkok was to consider and recommend the appointment of the Centre Director, it would be useful if at the same meeting, the appointment of the Head of Training Division be also considered. It was, therefore, proposed that the Government of Malaysia be requested to submit nominations for the Centre Director and the Head of Training Division for consideration of the Sub-Committee scheduled to meet in Bangkok in early December, 1969.

10.3.3. There was considerable discussion on the heavy burden that would fall on the shoulders of the Centre Director if he had to make the appointment of the Deputy Centre Director and other key personnel. The Steering Committee resolved that the Deputy Centre Director be appointed by the Centre Director with the approval of the Steering Committee and that the appointments of the Heads of Divisions be made by the Centre Director with the concurrence of the Steering Committee.

10.3.4. It was suggested that the Centre be requested to write to member governments for applications for the various posts and after selection had been made in accordance with the above resolution, the Centre again write to member governments informing them of the successful candidates and for assignment or secondment of the Centre.

11. PROGRESS REPORT ON THE ARCHITECTURAL AND ENGINEERING STUDIES OF THE 1ST PHASE OF THE CENTRE BUILDINGS (Document P5/SCMS/19)

The report was accepted with no questions asked.

12. THE NATIONAL CO-ORDINATING COMMITTEES

Reports from the National Co-ordinating Committees on their activities in connection with education in Science and Mathematics were received and accepted.

13. PROGRESS REPORT ON THE BROCHURE (Document P5/SCMS/19)

13.1. It was pointed out that this document was a summary of what had been circularised in Tokyo. The following changes were recommended in the annexure:

(a) Page4 p. 10 The national flag of Laos to be included;

(b) Page3 p. 6 Photographs of participants of the Centre to be shown;

(c) Page3 p. 5 A plan of the hostel, showing its unique design, to be included;

(d) Two charts to be included, one being the SEAMEO Organisational Chart and the other showing the Organisation of the Centre;

(e) Page 5 p. 12. Rear Cover. A map showing the SEAMEO countries to be provided on the rear cover.

13.2. It was decided that two versions of the brochure were to be printed (a) one which would be more script and less visual for academic institutions and (b) the other which would be more visual (in colour) and less script for business firms. The number of copies to be printed would be about 2,000 of each, depending on cost. A copy of the final draft versions of both would be sent to SEAMES for information.

14. PROPOSED REGIONAL WORKSHOPS

14.1. Joint UNESCO/RECSAM Chemistry Workshop December, 1969. (Document P5/SCMS/19)

The Programme Co-ordinator pointed out that the Chemistry Teaching Workshop was planned to be a pilot study as well. Topics for discussion and experimentation were based on materials gathered at the UNESCO Workshop in Bangkok. It was hoped that participants would bring materials used in their own countries to the workshop. Each country would send a total of 3 participants, one for each group. For 3(iii) the participant should be a practising teacher from a High School or its equivalent. The consultants would be attached to the Workshop for a period of about one week each to lead discussions and to conduct courses.

14.2. Physics Workshop

The Programme Co-ordinator advised that the Physics Workshop be organised after completion of the Chemistry Workshop.

15. DISCUSSION PAPER - STUDENT SELECTION FOR FUTURE RECSAM COURSES

15.1. Members of the Steering Committee were urged to draw the attention of their respective Ministries on point 3 A of the discussion paper. The meeting was informed that the evaluation paper (Ref. point 5) would be submitted to the Project Office soon. For each training course at the Centre, the Centre Director would:

15.1.1. Make known the maximum number of places available;

15.1.2. Allocate the number of scholarships available equitably to each member country;

15.1.3. Allocate scholarships which have not be taken up, to member countries on the basis of the needs of the country.

15.2. It was also decided that places in excess of scholarships might be offered to both member and non-member countries provided that no Centre funds would be used for this purpose.

16. DATE AND VENUE FOR THE SEVENTH MEETING OF THE STEERING COMMITTEE

The next meeting would be held in Penang at a date not later than May, 1970.

17. GENERAL

17.1. The meeting was informed that the services of Mr. Chang Min Kee, Special Adviser to RECSAM presently in London, would be invaluable in connection with fund-raising and the formulation and preparation of legal documents. In view of this it was proposed that he be invited to attend the Project Directors' meeting to be held from 3rd to 7th November, 1969, in Bangkok and to hold meetings with officers of the Malaysian Government on legal documents connected with RECSAM. The Programme Co-ordinator assured the Steering Committee that funds for his travel would be made available from items 4a and 4b of the budget without adversely affecting the programme of the Centre for the remaining period. In view of this, and on condition that Mr. Chang's visit would serve all the aforesaid purposes, the proposal was accepted. The Steering Committee decided that the invitation to Mr. Chang should stipulate that should he feel unable to perform all the aforesaid tasks he should decline the invitation.

17.2. It was decided to decline the offer of a Colombo Plan expert on Primary Mathematics, made by the New Zealand High Commission in Kuala Lumpur, as consultants for primary mathematics courses were already available.

17.3. Mrs. D.H. Khoo, who undertook to make a comparative study on the education of SEAMEO countries for RECSAM office, presented a set of questionnaires to members and advised members on the nature of the resource material that would be useful to the Centre. She would welcome annual education reports from 1964 onwards, if possible, copies of syllabuses and examination papers as well as sample textbooks on Mathematics and Science.

17.4. The meeting expressed its congratulations to Mr. B.C. Sekhar, a member of the International Advisory Council of RECSAM for having been awarded the Colwyn Medal, the highest reward of the Institution of the Rubber Industry, London for 1969.

Closing Speech of Mr. Chin Pin Seng, Chairman, Steering Committee at the Sixth Meeting of the Steering Committee held in Singapore from 21st - 24th October, 1969.

It can safely be said that the progress of the Centre towards the full operational phase since last April has been very satisfactory and our sincere thanks are due to the Programme Co-ordinator, Mr. C. Ganasalingam for his devotion and efficiency in carrying out the programmes and activities of RECSAM and for his guidance on matters raised at the plenary sessions.

I am most grateful to Dr. Soriano, our Vice-Chairman, for presiding at some of the plenary sessions, Mr. Chan Kai Yau, our Rapporteur-cum-Chairman of the Organising Committee for shouldering the heavy responsibility of organising the whole meeting and presenting the draft report of the deliberations.

The smooth conduct of the meeting was made possible by the splendid co-operation of the Vice-Chairman of the Organising Committee, Mr. John Tseng, the conference secretaries and all its members. To all of them I wish to extend my sincere thanks and appreciation.

I also wish to say 'Thank you' to Dr. Bob Jacobs, US/RED consultant, Prof. Dr. Soemantri Hardjoprakoso, Ag. Director, SEAMES, our esteemed delegates and observers for their contributions and guidance in our deliberations.

I wish to express, once again, the gratitude and thanks of the Steering Committee to the Government of Singapore and especially the Ministry of Education, Singapore and its officials for their hospitability, co-operation and assistance in hosting this meeting.

Press Communique

The Sixth Meeting of the Steering Committee of the SEAMEO Regional Centre for Education in Science and Mathematics (RECSAM), situated in Penang, Malaysia was convened in Singapore from 21st to 24th October, 1969. The Honourable Inche Mohd. Ghazali bin Ismail, Political Secretary to the Minister for Education, Singapore, addressed the gathering and declared the meeting open at 10.00a.m. on 21st October, 1969, at the Ministry of Education, Singapore. Addresses were also given by Prof. Dr. Soementri Hardjoprakoso, Acting Director, SEAMES and Mr. Chin Pin Seng, Chairman of the Steering Committee.

The objective of RECSAM is to help improve the teaching of Science and Mathematics within the SEAMEO member countries (Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand and Vietnam).

During the plenary sessions held in the last 4 days programme of activities based on the approved budget for the Second Interim year (1st July 1969 to 30th June 1970) was reviewed, the future of the Steering Committee and terms of reference for the Governing Board of the permanent Centre were considered.

Reports of the Primary Science Planning Workshop held in Manila, Philippines and the Primary Mathematics Planning Workshop held in Penang, Malaysia, in June-July this year were presented to the meeting and on the basis of these reports the meeting decided to hold the Primary Science and Primary Mathematics courses simultaneously in April 1970. In the meantime it was agreed that a regional pilot study Course in Chemistry Teaching would be held in December this year in co-operation with UNESCO.

The meeting also discussed the appointment of the permanent Centre staff, their job descriptions, rules and regulations, terms and conditions of service, and recruitment procedure.

Progress reports on the Architectural and Engineering Studies of the First Phase of the Centre Building Plans indicated that construction would begin in early 1970.

Reports from chairmen of National Coordinating Committees of member countries on programmes which are being developed for the improvement of Science and Mathematics education in their own countries were received and presented at the meeting.

The Steering Committee is most grateful to the Government of Singapore for its co-operation in hosting the meeting and for providing conference facilities, all supporting staff and services in the Ministry of Education.

It is proposed to hold the Seventh Meeting of the Steering Committee in Penang, Malaysia, before May 1970 in order to finalise all preparations for the full operational phase of the Centre beginning on 1st July 1970.

APPENDICES

APPENDIC 1.A

Address by Mr. Chin Pin Seng, Ag. Chairman Steering Committee at the Official Opening of the Sixth Meeting held in Singapore, from 21st to 24th October, 1969

The Honourable, Enche Mohd. Gazali bin Ismail, Political Secretary to the Ministry of Education, Singapore, Mr. Nathan Vanniasingham, Ag. Permanent Secretary, Ministry of Education, Singapore, Dr. Soemantri Hardjoprakoso, Ag, Director, SEAMES, Mr. Chan Kai Yau, Chairman of the Organising Committee, Distinguished Guests, Delegates, Consultants, Observers, Ladies and Gentlemen.

I have the honour of welcoming all the distinguished guests, representatives from international agencies and institutions, consultants, observers and delegates to the Sixth Meeting of the Steering Committee, which is being held in the great beautiful city of Singapore. We are priviledged to have with us this morning, the Honourable, Enche Mohd. Gazali bin Ismail, Political Secretary, Ministry of Education, Singapore, who has kindly consented to declare open this Sixth Meeting. To you, Sir, the Steering Committee expresses its sincere thanks and appreciation.

We are indeed very grateful to His Excellency, the Minister of Education, Singapore and his Ministry officials for their kindness and hospitality in hosting this Meeting at short notice. Such understanding and regional co-operation augurs well for the future.

We are glad to have with us to-day, Dr. Soemantri Hardjoprakoso, Ag. Director, SEAMES and we look forward to his wisdom and advice in our deliberations.

This Sixth Meeting of the Steering Committee of the Regional Centre for Education in Science and Mathematics, Penang, Malaysia is an historic occasion because the delegates are meeting for the first time as a regional centre with full legal status. The Memoranda of Understanding ratified by the principal donor, the United States Government, SEAMES and the host Government of Malaysia on 12th June 1969 has established RECSAM as a legal entity for carrying out its main objective "to assist member countries to improve the teaching of science and mathematics with a view to laying the foundation for meeting their skilled manpower requirements for their national economic development."

It is my sad duty as Ag. Chairman to refer to the sudden death of Mr. J.E.B. Ambrose, our beloved Chairman last April. It was a most serious loss to the Centre for under his dynamic professional leadership considerable progress in all areas of RECSAM's development into a permanent centre was made. His selfless devotion to RECSAM, his infinite capacity for work and his dynamic personality have earned our admiration. We are most greatly indebted to him for his splendid and solid contribution in setting the pace to develop RECSAM into one of the foremost regional science education centres in the world. On behalf of the Steering Committee I would like to record officially our profound condolences to the bereaved family.

I am pleased to report that in the midst of implementing the development of the Centre we have been able between last April and August to conduct successfully the month-long course of the BSCS Philippines Adaptation Course in High School Biology for twenty key personnel from member countries, Primary Maths. Planning Workshop, Primary Science Planning Workshop in Manila and Inter-Regional Project Workshop on the Use of Local Flora & Fauna in the Teaching of Biology. It also organised the participation of about 40 key personnel & senior teachers from SEAMEO countries in the following Malaysian Ministry of Education's national in-service courses:

(a) 6th Form Biology, Physics, Chemistry and Mathematics,

(b) Integrated Science Course Year II and

(c) Nuffield 'O' level Physics, Chemistry and Biology.

To the Malaysian Ministry of Education and its officials I would like to thank them, on behalf of the Steering Committee, for their co-operation in providing so many places in their courses to member countries.

The key education personnel and senior teachers who attended these courses and workshops not only have returned to their home countries with new ideas and the latest methodology in science teaching but also by comparing their diverse national education systems and exchanging ideas and views have come to understand and appreciate the vital role of education in general and science education in particular, in developing human resources, which are the most valuable of all natural resources, to meet the manpower needs for economic and social development in this region. Stimulated by the initial success of national efforts of some member countries in science curriculum reforms, they have recommended to their respective national governments how best to initiate or accelerate the improvement of science teaching in their own countries. That RECSAM in our short history of over 2 years has catalysed the reaction of member governments to reform their science curriculum cannot be disputed. The Republic of Philippines is setting up its second science education centre in its southern province. The Royal Kingdom of Thailand, the Republic of Indonesia and Malaysia have finalised their plans to establish their national science education centres. The Republic of Singapore is conducting a number of in-service courses on science and mathematics for practising teachers. RECSAM in its regional role of completing and supplying national programmes will tailor its programmes to meet the needs of the region.

Hence, a head start has been made by member governments and this is important in the difficult task of implementing science curriculum development owing to the natural resistance of teachers to change, set traditional syllabuses and examinations and the huge cost involved.

I am happy to report also that RECSAM has just established "protocol" with UNESCO, Paris as a result of the combined efforts of UNESCO, Asian Region Bangkok, and of my participation in the UNESCO/UNACAST Working Party Session in Paris last September on "the Improvement of Science Education with Special Reference to Developing Countries". Assistance in the form of two U.N. consultants, developed curriculum materials and sets of prototype kits of chemical apparatus on chemical equilibria will be provided for the RECSAM's Development of Chemistry Prototype Syllabus Course for Seames participants in December this year. We are indeed most grateful to the UNESCO officials both in Paris and Bangkok for their prompt co-operation and contribution to RECSAM's programmes. This according to them is just the beginning to joint ventures.

We treasure their assistance very dearly as UN & UNESCO, Science Teaching Division with its vast amount of experiences and resources on science curriculum development can assist RECSAM in developing into a successful Regional Centre for Education in Science and Mathematics for South-East Asia. UNESCO and UN Division of Science and Technology officials at the Paris meeting showed great interest in RECSAM as a viable regional project because this was the first time that developing countries in a region under the auspices of their Ministers of Education pooled their resources together to set up various regional centres in science, education and culture to "help themselves". The Working Party in its main recommendations to the UN Advisory Committee on the Application of Science to Technology stated that UN should support existing regional science education centres in its efforts to help improving science education in the next decade.

Assistance in the form of two experts, one for Primary Science and one for Primary Maths. programmes and appropriate equipment and instrumental materials has been promised by the Ministry of Overseas Development, England and the Malaysian Government as the host country for RECSAM has requested for such assistance. It has been planned to conduct these two courses next April with specialists also from the Statesand some member countries. This is a promising sign for the Centre, We are indeed grateful to these countries for their contributions.

RECSAM needs funds for scholarships and operational costs and appeals to member governments and their national philantrophists to donate generously to the Centre in order that their key education personnel and senior teachers can receive the best of training at the centre, for leadership in carrying out science reforms in their own countries.

Mr. Ted Slattery, US/AID Planning Consultant to the Centre, on completion of his term of contract of over two years, left for the States in mid-September. He was mainly responsible for the authorship of the Final Development Plan of RECSAM, which has been worked out with great care using the principles of the programming, planning budgeting system (PPBS) in use by all major US Government departments. This is a huge assignment as the Development Plan has to be distilled from the recommended programmes and courses out of seven national and regional seminars and three task force meetings involving hundreds of key science educators and international and regional consultants.

His humility, his charming personality, his sincerity and his friendliness combined with his boundless energy and his vast experience and intimate knowledge of planning and budgeting strategy have endeared him to every one of us who solicited his advice or worked with him. We are indeed most grateful for his invaluable contributions to the Centre and would like to record our appreciation and thanks to him. We extend our sincere wishes to Mr. and Mrs. Ted Slattery for their happiness and prosperity in the States.

Our very capable and devoted Programme Co-ordinator, Mr. C. Ganasalingam will complete his term of secondment to RECSAM at the end of the year. The post of Programme Co-ordinator will end with his completion of service. He has been associated with RECSAM since its inception in July 1967 and as the only full-time professional officer at the centre he has given yeoman service. On behalf of the Steering Committee I would like to thank him most sincerely for his excellent work. We do not want to say good-bye to him for we look forward with confidence to his secondment to one of the centre's top posts from next January in accordance with the proposed staff acquisition plan.

Thanks are due to the Public Works Department, Penang for having completed the architectural and engineering drawings of the RECSAM's Phase I Building Programme comprising one hostel block for 60 participants, one dining block with temporary accommodation to house the administrative division and some staff quarters. It is anticipated that actual construction work will begin in January next year.

Before I conclude I would like to thank Mr. Chan Kai Yau, the Chairman of the Organising Committee and his secretariat for their assistance in organising this meeting, the U.S. Government for its generosity and assistance to RECSAM as a principal donor, the Government of Malaysia for hosting the regional project and its various ministries for their invaluable assistance and co-operation in establishing the centre, various international organisations and foundations for their continued interest and support, and the distinguished guests, consultants, observers and delegates for their kind presence today.

Address by Prof. Dr. Soemantri Hardjoprakoso
Acting SEAMES Director, at the Sixth Meeting
of the Steering Committee at Singapore
October 21st, 1969

Mr. Minister, distinguished Guests,
Delegates, Consultants and Observers,
Ladies and Gentlemen:

First of all, on behalf of SEAMES, I would like to express our deep gratitude and sincerest thanks to Your Excellency, Mr. Ong Pang Boon, Minister for Education, Singapore for Your Excellency's kind cooperation. The unremitting generosity bestowed upon SEAMEC activities by the Government of Singapore has shown a great spirit of commitment by Singapore in rendering assistance which greatly contributes to the success of the Organization.

I also wish to convey our heartfelt thanks to the Organizing Committee of the host country for its warm hospitality and cordial co-operation. To Mr. Ganasalingam, our programme coordinator of RECSAM, may I extend my congratulations on the successful operation of your Project activities.

In the coming decade, it is important that Southeast Asian Nations build their own industries based on their agricultural potential. A common market in the industries for agricultural products should be established and the industrial products should be synchronized with the daily needs of the people.

In order to achieve these goals, a certain way of thinking is needed. The disciplined way of thinking should be in accordance with the laws of Natural and Social Sciences. To start this new approach, we must first promote the scientific and mathematical ways of thinking.

RECSAM has already functioned as an institution to lay the specific foundation of scientific thinking. The functions of this Project are not only to contribute to the profession but also to serve the Region as an important means of spreading this scientific thinking. The conservative Southeast Asians have the tendency to rely, to a great extent, on supernatural and spiritual phenomena and the majority of the people in Southeast Asia still concentrate their thoughts on life beyond the grave with its theological implications. Because of this, their way of thinking is far from scientific. Here RECSAM should direct its leadership to guide the people of Southeast Asia towards a more objective way of thinking and to lead them closer to the practical and efficient way of life. This modern approach to life will be conducive to the progress of Southeast Asia.

We hope that thereby we can play a more important role in the world. Dear Colleagues, I would like to add here that our worthy and commendable objectives are to be achieved not by speeches, not by reiterating high sounding phrases, but only by constant sacrifice and concerted effort. And in this we all must play our part.

Your Excellency, Ladies and Genglemen, May I express my sincere thanks for your presence here today and I am positive that strong determination through active participation would ensure the success of this Meeting.

Thank you.

SPEECH BY INCHE MOHD. GHAZALI BIN ISMAIL, POLITICAL SECRETARY TO THE MINISTRY OF EDUCATION, AT THE OPENING CEREMONY OF THE 6TH STEERING COMMITTEE MEETING, SEAMEC REGIONAL CENTRE FOR EDUCATION IN SCIENCE AND MATHEMATICS ON TUESDAY, 21.10.1969, AT 9.30 A.M. AT THE CONFERENCE ROOM (10TH FLOOR), MINISTRY OF EDUCATION, KAY SIANG ROAD, SINGAPORE, 10.

I am honoured to have this opportunity of greeting you at the opening of the Sixth Meeting of the Steering Committee of the SEAMEC Regional Centre for Education in Science and Mathematics.

The importance of science and mathematics education at elementary and secondary levels for promoting the economic development and industrialisation of a country is generally recognised. It is also generally true that countries which are highly industrialised enjoy higher standards of living and have greater influence over international affairs. Therefore it is perfectly natural for countries in this region to have such aspirations. For us, industralisation is not merely an aspiration but a matter of survival.

To success of industrialisation depends very largely on the quality of our human resources and its proper utilisation. An effective and far-sighted programme of science and mathematics education will play an increasingly dominant role in the development of our human resources in this technological age. Examples of countries which have recently developed into powerful industrialised states on their own initiative, clearly show that technology and industry can only flourish under certain favourable conditions, chief among which are a higher standard of education biased towards science, mathematics and technical subjects and a well-organised, highly-disciplined, forward-looking population that can bravely face new challenges and quickly adapt itself to the changing times.

We in Singapore believe that an enlightened scientific and mathematical education is of paramount importance at all levels not only for producing our much needed scientists, technologists, technicians and skilled workers, but also to nurture a new generation of people who will eventually sustain a modern technological society with its new values and norms. This meeting concerned with education in science and mathematics is therefore of special importance and relevance to us. I hope that, through the deliberations of this meeting, the Mathematics and Science Centre in Penang will be brought one step towards the fully operational stage of its development.

I now have great pleasure in declaring the meeting open.

SEAMEO REGIONAL CENTRE FOR EDUCATION IN SCIENCE & MATHS

Second Revised Budget for the Interim Centre (Nurturing Period)
1st July 1969 - 30th June 1970 (w.e.f. 1st October 1969)

		Mal. Govt. Contribution		U.S. Govt. Contribution		Remarks
I. CENTRE OPERATIONAL COSTS:						
1. Administration.						
(i) Professional Staff. Centre Director 1.12.69 - 31.12.69	1000x1			1000		Change includes pension, housing and indemnity contributions
1.1.70 - 30. 6.70	625x6	3750				
	* 350x6	2100				
Head of Training Division 1.1.70 - 30.6.70	600x6	3600				
	* 350x6	2100				
Programme Co-ordinator	590x6			3540		
	* 350x6	2100				
Training Officer 1.12.69 - 30.6.70	500x7			3500		Change
	* 300x7	2100				
Information Officer 1.12.69 -30.6.70	500x7			3500		Change
	* 300x7	2100	17850		11540	
(ii) Consultants						No change
Planning Consultant US/AID (1 year)				27000		
Information Consultants US/AID short term (3 - 4 months)				10000		
Training Div. Consultant US/AID (1 year)				27000		
One Consultant from U.K. (1 year)		18000		64000**		
One Consultant from U.K. (Primary Science 6 months)		10000	28000			
o/f.			45850		11540	

* Contributions to Pension, housing and indemnity
** To be paid separately by US/AID hence not added here

		Mal. Govt. Contribution	U.S. Govt. Contribution		Remarks
b/f		45850		11540	
(iii) Support Staff (Administration)					
Administrative Asst.	$330x12		3960		
Secretary (Personal Asst.)	$170x12		2040		
4 Clerks/Typists	$100x12x4		4800		
Cataloguing Asst.	$70x12		840		
2 Office Keepers/ Duplicating Machine Operators	$60x12x2		1440		
Financial Asst. 1.1.70 - 30.6.70	$250x6		1500		Change
Van Driver 1.11.69 - 30.6.70	$60x8		480		Change
				15060	
2. Supplies					
Stationery Paper & Stencils	$400x12			4800	No change
3. Operational Expenses					
Postages	$200x12		2400		
Telephone/Telegrams	$120x12		1440		No change
Overtime Allowances			1000		
Miscellaneous Printing Costs			1000		
Contingencies			500		
				6340	No change
4. Travel and Per Diem for Centre Staff					
(a) To member countries/or other SEAMEC projects/SEAMES Bangkok			5300		Change
(b) To countries outside SEAMEO Region to attend important Science and Maths Education Conferences/Workshops/and to seek co-operation and assistance.			2000		Change
(c) Local Travel (including operational costs of Centre Van)			2000		Change
				9300	
c/f		45850		47040	

		Mal. Govt. Contribution		U.S. Govt. Contribution		Remarks
5. Information and Special Services Division	b/f		45850		47040	—
Regional Newsletter and Bulletin Services				1500		Change
Science & Maths. Education Materials Bulletin				500		Change
Regional Bibliography of Biological Research				1000		No change
Purchase of Library Materials				2000		No change
					5000	
6. Contingencies					960	
7. Contributions in Services and Facilities by Govt. of Malaysia						
(i) Pro-rated salaries of Ministry of Education Staff up up to 31st December 1969		1706				
(ii) Pro-rated costs of Nuffield and Integrated courses given by Malaysian Ministry of Education/Ministry of Overseas Development U.K.		5737				
(iii) Supporting services provided by the Malayan Teachers College, Penang up to 30th June 1970		2095				
(iv) Equivalent Rental Costs of Malayan Teachers College Buildings and services loaned to the Regional Centre		37520				
			47058			
Total Operational Costs			92908		53000	

II. SPECIAL FUNDS: (All items have been changed)

Code	Course	Participants	Duration/Date	Cost	
	1. Training				
	(i) Nuffield 'O' Level Science	20	2 weeks	4200	
	(ii) Scottish Integrated Science	6	3 weeks	1500	
TAG-1	(iii) Seminar for Senior National Administrators	12	1 week March 1970	3840	
TCE-1	(iv) Modern Methods of Teaching and Evaluation of Primary Science	18	4 months April - July 1970	26000	
	(v) Modern Methods of Teaching and Evaluation of Primary Maths.	18	-do-	19860	55400
	2. Research				
RAG-1	(i) Administrative Techniques for Project Implementation	12	1 month March 1970	3600	
RAG-2	(ii) Science and Maths. Requirement Analysis	12	3 weeks March 1970	3000	
	(iii) Dev. Physics Prototype Syllabus	12	3 weeks June 1970	3000	
	(iv) Chemistry Teaching Workshop	18	3 weeks Dec. 1969	4500	14100
	3. Steering Committee Meetings		Oct. 1969 Singapore May 1970 Penang	7500	7500
			Total Special Funds	-	77000

I.	Total Operational Costs	-	US$ 53,000
II.	Total Special Funds	-	77,000
	GRAND TOTAL	-	US$130,000

APPENDIX 3

National programmes that are being developed for the improvement of Education, including Science and Mathematics, in Indonesia

The improvements of education, including Science and Mathematics are included in the five year development plan of Indonesia (1969-1974).

Various steps of action have been taken by the Ministry of Education and Culture and special committees are now working on the identification and evaluation of problems in various fields. In the field of Mathematics education, for example, the team consisting of members of teaching colleges and universities are assigned to identify the present status of Science and Mathematics education in Indonesia and to make recommendations to the Minister of Education for the improvements and the way to put new Mathematics in the curriculum.

As regard to chemistry teaching there were two symposia held in Bandung and Jogjakarta to formulate the improvements of chemistry teaching.

As regard to the identification of national problems of education, workshops have been held in Bogor (Tjipajung) and is to be continued in Djakarta next week.

As regard to the National Committee for RECSAM project, the Ministry of Education and Culture is now preparing a draft of the organisation of the National Committee for SEAMEC and Unesco to be submitted to the government for its approval. For the time being communication between RECSAM and Indonesia could be done through the Bureau of Foreign Affairs, Ministry of Education and Culture of the Republic of Indonesia, Djalan Tjilajap, Djakarta Indonesia.

APPENDIX 4

The National Co-ordinating Committee - Malaysia

The objectives and functions of this committee are at present performed by the Science Division of the Ministry of Education with the help of the Central Science and Mathematics Planning Committee and various sub-committees.

The various planned projects are as follows:-

(a) The Primary (Elementary) Science Project for the first 3 grades of the Primary Schools (Ages 7, 8 and 9 years).

(b) The Primary (Elementary) Mathematics Project, as for the above.

(c) The Integrated Science Course for Junior High Schools.

(d) New Mathematics Project for Junior High Schools.

(e) Nuffield 'O' Level Curriculum for Senior High School.

Detailed report of (a), (b), (c) and (e) are given in the Report of the 5th Meeting of the Steering Committee SEAMEC Regional Centre for Education in Science and Mathematics, The In-Service courses for trained teachers are being held during the school holidays in August and December of every year for (c) and (e). The primary Science and Mathematics projects are being implemented through weekend training of teachers in various districts, co-ordinated by the Science Division of the Ministry of Education.

The New Mathematics Project for the junior high schools will be launched in 1970. The procedure adopted is the same as that of the Integrated Science Course. The first In-Service course for 60 trained teachers from the 27 pilot schools will be held in Kuala Lumpur on 15th December, 1969.

The existing Mathematics syllabus is heavily biased towards the traditional Mathematics and does not include the new Mathematics which has been established in the last 100 years. The usefulness of the contemporary mathematical knowledge in many domains has made it necessary to introduce modern ideas and topics in Mathematics throughout the school course. The syllabus has been influenced by the series of books, "Modern Mathematics for Schools" prepared by the Scottish Mathematics Group.

Arrangements are being made to establish the National Science and Mathematics Education Centre. Once this is established the "National Committee" will be formed along the guidelines recommended by the Steering Committee.

APPENDIX 5

NATIONAL PROGRAMMES THAT ARE BEING DEVELOPED OR HAVE BEEN CONDUCTED FOR THE IMPROVEMENT OF MATHEMATICS & SCIENCE TEACHING IN SINGAPORE.

A new Mathematics Syllabus for Secondary Schools, incorporating new topics like sets, rectors, groups, matrices, intuitive topology etc., was introduced at the beginning of 1968 and a survey was carried out to assess the mathematical attainments of pupils learning the new mathematics in the middle of 1969.

The Primary Mathematics Syllabus is being reviewed and a guideline for teachers is being prepared.

New syllabuses incorporating modern topics in Physics, Chemistry and Biology have been introduced as alternatives to their traditional counterparts in Upper Secondary and Pre-University classes and the re-training of teachers to cope with these new syllabuses was completed in 1968.

The Primary Science Syllabus has been revised and is awaiting implementation.

Since 1966, numerous refresher courses in mathematics and science have been conducted for teachers of primary and secondary schools, and more are being planned for 1970.

APPENDIX 6

OUTLINE OF THE REPORT ON NATIONAL PROGRAMMES FOR THE IMPROVEMENT OF SCIENCE AND MATHEMATICS TEACHING BY PROF. DR. BITAK RAKBOLDEJ, CHIEF DELEGATE FROM THAILAND

A major development in science education in Thailand is the UNDP's assistance in the promoting of the teaching of science and technology.

I. A request to the United Nations was made in August 1969. The purpose of the project, the duration of which is six years consisting of a two-year preparatory phase and a four-year full project phase, is to assist the Government of Thailand in establishing the National Institute for the promotion of the teaching of science and technology in Bangkok.

II. It is expected that in the two-year preparatory phase of the project, starting January 1970 particular attention will be given to setting up the organization of the National Institute and to developing prototype curriculum materials. Development work will continue during the four year second phase of the project, but during this phase, increasing attention will be given to trials, training of personnel, and implementation in the schools.

III. The project will undertake the following:

(a) development and production of prototypes of improved and modernized programs and materials in teaching science and technology

(b) propagation of improved science and technology programs in the educational systems and institutions

(c) revision of examination materials and procedures and implementation in the school system

and (d) promotion of training and upgrading of professional and technical personnel in the teaching of sciences and technology in Thailand.

IV. The cost of the Over-all project, phase I & II (6 year duration)

UNDP (special fund) requested	$1,450,300
the Government contribution	$4,121,000

(b) Elementary education level;

Conducted by the National In-Service Education Centre - Saigon, the elementary teachers institutions and the provincial departments of elementary education:

(i) Purposes: Help elementary teachers both in learning and teaching Science and Mathematics

- Acquaint them with progress in elementary Science and Mathematics
- Help them how to use Science and Mathematics textbooks published by the Ministry of Education

(ii) Participants:

100 for each workshop.

(iii) Duration: 3 to 4 weeks

(iv) Teaching Staff:

Experienced elementary inspectors, teacher-educators, returnees from RECSAM.

3. Other organization conducting In-Service education programs for teachers in Science and Mathematics: The Catholic Association in Vietnam.

4. Participants sent to RECSAM since August 1968:

- Nuffield "O" Level Science Course for Upper Secondary High Schools:	3
- Refresher courses for Sixth form teachers on Biology, Chemistry, Mathematics, Physics:	4
- Biology Sciences Curriculum Study Adaptation Courses:	4
- Integrated Science Course for Lower Secondary Schools:	3

APPENDIX 7

SUMMARY OF NATIONAL PROGRAMMES FOR THE IMPROVEMENT OF SCIENCE AND MATHEMATICS EDUCATION

By

Dr. Dolores Hernandez,
Director, Science Education Center,
University of the Philippines,
Diliman, Quezon City,
Philippines.

1. A plan of operations for a science education project in the Philippines has been finalized and agreed upon by the Government and the UNICEF. The project involves various educational institutions and may eventually involve other funding agencies. Basically, the project has the purpose of improving science education at the school level through teacher education and the provision of essential equipment and teaching materials. Institutions with possibilities for providing leadership on a regional basis (regions within the country) in science education have been selected to participate in the program. College instructors are being brought to the University of the Philippines (Science Education Center) to train in methods, materials and new approaches in the teaching of sciences at the secondary level. The programme lasts for 3 semesters and 1 summer session; the participants may early the degree of Master of Arts in Teaching, with a major in a specific science area. When these teacher educators return to their institutions they will be provided with essential equipment and materials to enable them to conduct summer institutes for science teachers of their region and to offer undergraduate degrees for science and math teachers. The institutions that show the most promise, will be selected for development into regional science teaching centers. It is at this point where private foundations may assist as has already been done for 1 regional science teaching center which serves part of the southern regions -- the Notre Dame Educational Association (NDEA) of Cotabato. This is the first regional center. It is expected to have 4 more in the near future and an undetermined number later on.

The first group of teacher educators from 11 selected teacher training institutions have started their M.A.T. programmes at the University of the Philippines. The programmes this year are offered in the fields of physics and chemistry teaching. There are 10 participants in the chemistry programme and 12 in the physics programme. This group started in June 1969 and will terminate their programmes in October 1970. By June 1970 there will be an additional 46 teacher educators who will take their specializations in one of 3 fields (biology - 11, general science - 16, and high school math - 19).

2. The Science Education Center, University of the Philippines, in addition to playing a control role in the project above, continues being involved in curriculum development projects. Some of its books are being finalized for publication as final editions, some new books are being produced. These projects are all carried out in collaboration with the Department of Education (mainly the Bureau of Public Schools).

3. The Bureau of Public Schools has conducted several in-services training programmes in the sciences and mathematics for public school teachers on a regional basis. These regional workshops were Unicef-supported. The teachers were provided with new books, which they were taught to use. The workshops were conducted by trained teachers who themselves had received their M.A.T. degrees in the new science and math courses or had participated in summer insitutes sponsored by the National Science Development Board.

   B.P.S. is also assisting the schools to improve their laboratories. A recently approved law provides for funds for this purpose. A model laboratory based on laboratory plans especially designed for Asian schools (Unesco ARISBR project) is being planned. An architect, Mr. Soderberg from ARISBR is expected in November to assist in planning. His services will also be utilized by the Philippine Science High School, the Science Education Center and NDEA in Cotabato.

4. The University of the Philippine College of Agriculture (UPCA) in Los Banos, continues to conduct summer institutes for high school biology - stress is given to field work and laboratory experiements suitable to this level. These institutes have been sponsored jointly by the UPCA and the Biology Teachers Association (BIOTA) of the Philippines.

5. The BIOTA has continued publishing its quartely journal which comes off the press regularly four times a year; it encourages research among high school teachers through grants secured from the National Science Development Board, which enables them to work with scientists. The journal itself contains much useful information for college and high school teachers of biology.

6. The Asian Association for Biology Education (AABE) which has its secretariat at the Science Education Center of the University of the Philippines continues to publish regularly its newsletter. The AABE has a mailing list of over 600 biology teachers in Asia and is circularized to all secondary school libraries in the Philippines. The newsletter is intended to help secondary school teachers of biology.

7. The private schools have also been active in conducting in-service programmes for teachers, in stimulating the interest of their students in science through club activities and participation in symposia and conferences.

8. The National Science Development Board has continued its active support of science education activities throughout the country through funding and stimulating interest in summer institutes, making inexpensive equipment, scholarship programmes for both graduate and undergraduate levels, giving grants to teachers for research studies.

OUTLINE OF THE REPORT ON NATIONAL PROGRAMMES FOR THE IMPROVEMENT OF SCIENCE AND MATHEMATICS TEACHING BY MR. CAO MINH KHAI, DELEGATE FROM THE REPUBLIC OF VIET-NAM

1. The establishment of the National Committee for Science and Mathematics Research by decree on September 24, 1968, as a first step towards the formation of the National Co-ordinating Committee.

(i) Purposes: Study ways and means for the improvement of Science and Mathematics teaching at elementary and secondary education level by:

- curriculum innovation
- teachers training and re-training

(ii) Composition:

- 1 Chairman
- 1 Deputy Chairman
- 1 Secretary General
- 6 Sub-Committees

Mathematics, Physics, Chemistry, Biology, Geology, Elementary Science.

2. In-Service Training Programs:

(a) Secondary education level:

Conducted by the Faculty of Pedagogy, University of Saigon and University of Cantho.

(i) Purposes: Help secondary school teachers to improve the methods of teaching Science and Mathematics.
- Acquaint them with progress in Science & Maths.

(ii) Participants:

From 40 to 100 participants for each workshop.

(iii) Duration: 10 days

(iv) Teaching staff:

Professors of the Faculty of Pedagogy, Faculty of Science and returnees from RECSAM.

APPENDIX C

The Sixth Meeting Of The Steering Committee SEAMEC Regional Centre for Education in Science and Mathematics, Singapore - 21st - 24th October, 1969.

PROGRAMME

Tuesday 21st October

0900 - 0920	Arrival of Guests and Participants
0930 - 1000	Opening Ceremony
	Address by Mr. Chin Pin Seng, Acting Chairman, Steering Committee.
	Address by Prof. Dr. Soemantri Hardjoprakoso, Acting Director, SEAMES.
	Opening Address by the Honourable Inche Mohd. Ghazali bin Ismail, Political Secretary to the Minister for Education.
1000 - 1030	Refreshments
1030 - 1200	Business Section
	Election of Chairman
	Report of the Fifth Meeting of the Steering Committee held at the National Education Centre, Tokyo, Japan - 31st March - 7th April, 1969. Document P5/SCMS/16.
	Matters Arising.
1200 - 1400	Lunch
1400 - 1530	Business Session
	Annual Report on the events, activities and financial expenditure of the First Interim Year (Nurturing Period 1st July, 1968 - 30 June, 1969)
1530 - 1545	Refreshments
1545 - 1700	Business Session
	Amendment of the Programme of Activities based on the approved Budget for the Second Interim Year (Extended Nurturing Period 1st July, 1969 - 30th June, 1970)

Wednesday 22nd October

0900 - 1030	Business Session Reports of:- (i) Primary Science Planning Workshop - Manila, Philippines - 24th June - 3rd July, 1969. (ii) Primary Mathematics Planning Workshop - Penang, Malaysia - 30th June - 3rd July, 1969. (iii) Integrated Science Course Year II and Nuffield "O" Level Courses in Biology, Chemistry and Physics - Penang, Malaysia, 4th August, 22nd August, 1969.
1030 - 1045	Refreshements
1045 - 1200	Business Session Future of the Interim Steering Committee and terms of reference for the Permanent "Governing Board" or "Advisory Committee" or "Co-ordinating Committee" or "Board of Trustees". Working paper prepared by Planning Consultant.
1200 - 1400	Lunch
1400 - 1530	Business Session Appointment of Centre Staff The proposed Centre staff job description, rules and regulations, terms and conditions of service and staff recruitment procedure of permanent RECSAM.
1530 - 1545	Refreshments
1545 - 1700	Business Session Progress Report on the Architectural and Engineering Studies of the First Phase of the Centre Building Plans.
1730 - 1900	Reception by Permanent Secretary. Venue: Ministry of Education Recreation Club.

Thursday 23rd October

0900 - 1030	Business Session Reports from Chairmen of National Co-ordinating Committees.
1030 - 1045	Refreshments
1045 - 1200	Business Session Brochure of the Regional Centre Proposed Regional Workshops
1200 - 1400	Lunch
1400 - 1530	Business Session Criteria for selection of RECSAM participants and guidelines to ensure equitable representation from each member country.
1530 - 1545	Refreshments
1545 - 1700	Business Session Date and Venue for the Seventh Meeting of the Steering Committee. General
1900 - 2100	Dinner Given by the Chairman, Steering Committee Venue : Peking Restaurant

Friday 24th October

0900 - 1200	FREE
1200 - 1400	Lunch
1400 - 1500	FREE
1500 - 1700	Final Business Session Adoption of the Draft Summary Report Press Communique Closing Remarks.

APPENDIX 10

SIXTH Meeting of the Steering Committee SEAMEC Regional Centre for Education in Science and Mathematics, Singapore - 21st - 24th October, 1969.

List of Participants

(A) DELEGATES

INDONESIA

1. Dr. Didin S. Sastrapradja,
   Executive Secretary,
   Indonesian Institute of Sciences,
   Director, Botanic Gardens,
   Djalan Tenju Tjhik Ditiro 43,
   Indonesia.
2. Prof. Dr. Josef T. Soehakso,
   Professor of Mathematics,
   Faculty of Pasti Alam,
   Skip Unit III,
   P.O. Box 36,
   Jogjakarta,
   Indonesia.

MALAYSIA

1. Mr. Chin Pin Seng,
   Acting Chairman,
   Steering Committee,
   Technical Teachers' College,
   Cheras Road,
   Kuala Lumpur,
   Malaysia.
2. Mr. Wahidullah Khan,
   Senior Organiser (Mathematics)
   School Section,
   Ministry of Education,
   Kuala Lumpur,
   Malaysia.

PHILIPPINES

1. Dr. (Mrs.) Liceria B. Soriano,
   Asst. Director of Public Schools,
   Bureau of Public Schools,
   Manila,
   Philippines.
2. Mr. Aurelio Juele,
   Superintendent of Science
   Education,
   Bureau of Public Schools,
   Manila,
   Philippines.

SINGAPORE

1. Mr. Chan Kai Yau,
   Assistant Director of Education,
   Research and Statistics,
   Ministry of Education,
   Singapore 10.
2. Mr. John Tseng,
   Principal,
   Bukit Merah Secondary School,
   Lengkok Bahru,
   Singapore 3.

THAILAND

1. Prof. Dr. Bitak Raksaboldej,
Head, Department of Science
and Mathematics,
College of Education,
Prasanmit Road,
Bangkok,
Thailand.

2. Dr. (Miss) Suchart Ratanakul,
Assistant Professor of Maths.,
College of Education,
Prasanmit Road,
Bangkok,
Thailand.

VIETNAM

1. Mr. Cao Minh Khai,
Deputy Director,
National In-Service-Education Centre,
280 Thanh Thai Avenue,
Saigon,
Vietnam.

(B) RECSAM INTERIM OFFICE

1. Mr. Chelliah Ganasalingam,
Programme Co-ordinator,
Regional Centre for Education in Science and Mathematics,
Penang,
Malaysia.

(C) SEAMES BANGKOK

1. Prof. Dr. Soemantri Hardjoprakoso,
Acting SEAMES Director,
Ministry of Education,
Bangkok,
Thailand.

2. Mr. Khoo Eng Choon,
Assistant Director II,
SEAMES,
Ministry of Education,
Bangkok,
Thailand.

3. Mrs. Vajiraya Buasri,
Secretary I,
SEAMES,
Ministry of Education,
Bangkok,
Thailand.

(D) CONSULTANT

1. Dr. Rober Jacobs,
   Regional Education Adviser &
   Consultant to SEAMES,
   Office of Regional Education Development,
   United States Embassy,
   Bangkok,
   Thailand.

(E) OBSERVERS FROM PROJECT CENTRES

1. Mrs. Tai Yu-Lin,
   Director,
   SEAMEC Regional English Language Centre,
   Singapore.

2. Mr. Ly-Chanh-Duc,
   INNOTECH Project Co-ordinator,
   SEAMES,
   Ministry of Education,
   Bangkok,
   Thailand.

3. Mrs. D.H. Khoo,
   Acting Head,
   Education Department,
   Malayan Teachers' Training College,
   Penang,
   Malaysia.

4. Miss Duong Van Quyen,
   Assistant to INNOTECH Project Co-ordinator,
   SEAMES,
   Ministry of Education,
   Bangkok,
   Thailand.

APPENDIX 11

Organising Committee for The Sixth Steering Committee Meeting of RECSAM, 21st - 24th October 1969 Singapore

Chairman/Rapporteur	Mr. Chan Kai Yau	Assistant Director of Education/Research & Statistics
Vice-Chairman	Mr. John Tseng	Principal, Secondary School
Secretary	Mr. Yeo Kok Keong	Specialist Inspector/ Mathematics
Conference Secretaries	Mr. J.T. Christie	Principal, Secondary School
	Mr. Chee Keng Long	Principal, Secondary School
	Mr. Koh Beng Thaim	Principal, Secondary School
	Mrs. Lily Tay	Asst. Specialist Inspector/ English
Secretariat Staff	Mr. Hubert Gan	Higher Clerical Officer
	Mr. David Manickam	Clerk
	Mr. Chan Kum Chaun	Clerk
	Mrs. Indra Sapai	Typist
	Miss Chaing Yuh Wan	Typist
	Miss Phang Sin Imm	Typist
	Mr. Mohd. Ibrahim	Office Keeper
	Mr. Abdul Kadir bin Marican	Office Boy
Documentation	Mr. G. Rajamoorthi	Specialist Assistant/D. of Research
	Mr. Teo Eng Chuan	Asst. Specialist Inspector/ Science
Finance	Miss Kan Sou Tin	Asst. Specialist Inspector/ Mathematics
Invitation	Mr. Goh Kong Lye	Assistant Inspector of Schools
Transport, Airport Reception, Visits	Mr. Fok Fook Choon	Assistant Inspector of Schools
	Mr. Lian Sek Lin	Assistant Inspector of Schools
	Mr. Sin Kwai Meng	Assistant Specialist Inspector
Conference Arrangement	Mr. Teo Ting Kok	Specialist Inspector/Science
	Mrs. L. Sigamoney	Asst. Specialist Inspector/ Science
Reception	Mrs. Mabel Yang	Asst. Specialist Inspector/ Domestic Science

Press Statement

Sixth Meeting of the Steering Committee SEAMEC Regional
Centre for Education in Science and Mathematics to be held in
Singapore, 21st - 24th October, 1969.

The Regional Centre for Education in Science and Mathematics (known as RECSAM in short) located in Penang, Malaysia, is one of many regional projects established by the South-East Asian Ministers of Education Organization. The participating countries of the regional project are: Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam. The broad objectives of RECSAM during the present interim phase are: "To help the participating countries in improving the teaching of science and mathematics in the region in order to lay the foundations for meeting the technically and scientifically trained manpower requirements of the region. It is proposed to start initially at the elementary and secondary levels and involve teacher-training institutions and colleges of education, faculties of mathematics and science and other faculties as may be necessary in implementing the programmes."

The present Steering Committee, with two delegates from each participating country, held its first meeting in May, 1967. As its successive meetings held in Indonesia, the Philippines, Thailand and Japan, matters such as the development plan, the budget, the funding scheme, programmes of the Centre and staffing of the Centre were discussed. Among the items to be discussed at this meeting will be the long range plans for the Centre, the appointments of director and other senior staff and the Centre building plans.

The Meeting will be declared open by the Hon. Inche Ghazali bin Ismail, the Political Secretary to the Minister for Education, Singapore on Tuesday 21st October 1969 at 9.30a.m. at the Ministry of Education. Both Mr. Chin Pin Seng the Acting Chairman of the Steering Committee and Prof. Dr. Soemantri Hardjoprakoso, Acting SEAMES Director, will address the meeting.

APPENDIX 13

SEAMEO REGIONAL CENTRE FOR EDUCATION IN SCIENCE AND MATHEMATICS

THIRD INTERIM PHASE
STATEMENT OF EXPENDITURE AND BALANCE FOR THE PERIOD
1ST JULY 1968 - 30TH JUNE 1969

	Budget Item	Original Amount Budgetted		Total Expenditure	Balance
		US$	M$	M$	M$
1.	ADMINISTRATION	37,260.00	113,553.58	53,231.21	60,322.37
2.	OFFICE EQUIPMENT	4,270.00	13,013.25	5,902.50	7,110.75
3.	SUPPLIES	6,000.00	18,285.60	7,936.01	10,349.59
4.	OPERATIONAL EXPENSES	10,000.00	30,476.00	11,490.01	18,985.99
5.	TRAVEL & PER DIEM	5,000.00	15,238.00	9,170.36	6,067.64
6.	STEERING COMMITTEE & TASK FORCE	16,000.00	48,761.60	48,492.01	269.59
7.	TRAINING DIVISION	30,129.00	91,821.14	64,522.07	27,299.07
8.	INFORMATION AND CLEARING HOUSE DIVISION	6,000.00	18,285.60	2,508.80	15,776.80
9.	FUND RAISING	5,000.00	15,238.00	14,988.12	249.88
10.	CONTINGENCIES	5,341.00	16,277.23	640.10	15,637.13
	TOTAL:	125,000.00	380,950.00	218,881.19	162,068.81

SEAMEO REGIONAL CENTRE FOR EDUCATION IN SCIENCE AND MATHEMATICS

THIRD INTERIM PHASE BUDGET 1ST JULY 1968 TO 30TH JUNE 1969 (Nurturing Period)
REVISED BUDGET WITH EFFECT FROM 1ST FEBRUARY 1969

	BUDGET PARTICULARS	AMOUNT PROVIDED IN ORIGINAL BUDGET	REVISED BUDGET WITH EFFECT FROM FEBRUARY 1969	REMARKS
		US$	US$	
1.	ADMINISTRATION	37,260.00	19,000.00	
2.	OFFICE EQUIPMENT	4,270.00	7,500.00	Includes US$3,500 for purchase of van.
3.	SUPPLIES	6,000.00	6,000.00	No change.
4.	OPERATIONAL EXPENSES	10,000.00	7,000.00	
5.	TRAVEL & PER DIEM	5,000.00	5,000.00	
6.	STEERING COMMITTEE AND TASK FORCE	16,000.00	20,000.00	
7.	TRAINING DIVISION	30,000.00	25,000.00	
8.	INFORMATION & CLEARING HOUSE DIVISION	6,000.00	7,000.00	
9.	FUND RAISING	5,000.00	5,000.00	
10.	CONTINGENCIES	5,341.00	3,500.00	
11.	RESERVED FOR TRANSFER TO FINAL INTERIM PHASE	-	20,000.00	
	TOTAL:	125,000.00	125,000.00	

APPENDIX 14

SIXTH MEETING OF THE STEERING COMMITTEE
TO BE HELD IN SINGAPORE
OCTOBER 21ST - 24TH, 1969

DISCUSSION PAPER PREPARED BY MR. T.B. SLATTERY, RECSAM PLANNING CONSULTANT

TERMS OF REFERENCE OF FUTURE RECSAM STEERING COMMITTEE

INTRODUCTION

The existing Steering Committee of RECSAM is currently interim in nature and its tenure of office unclear at the present time. It also has no specific terms of reference as to selection of members, responsibilities, authority, etc.

With RECSAM beginning to make the transtition from the interim phase to an eventual legal entity, and with the appointment of a permanent Centre Director in the not too distant future, would appear most important that the long range role of the Steering Committee (or what over the Centre's future governing board should be called) needs to be thoroughly discussed and recommendations for explicit terms of reference be prepared for submission to the next SEAMEC Meeting.

DISCUSSION

It is assumed here that RECSAM like other Centres and organisations should have some governing board representing SEAMEO Member Countries if it is to be truly regional in nature and scope. Given such an assumption, the following questions would suggest themselves:

A. Title - Should it still be called "Steering Committee" or would a title such as "Governing Board" be more appropriate?
(AIT calls this group a Board of trustees, SEARCA - Advisory Council and RELC - Co-ordinating Committee)

B. Functions - What is the authority and responsibility of the Committee as regards RECSAM? What will be its relationships to the Centre Director? Will it establish definitive policy guidelines via SEAMEC and issue them periodically to the Director? How will it evaluate the effectiveness of the Centre's staff and programmes? What kinds of reports will it require from the Centre Director and how often?

Will the Centre Director be an accountable to the Committee as a group or will the Chairman have unique authority? If so - what is it? It would appear wise to identify the specific interrelationships between Director and committee carefully in advance to avoid future problems.

C. Composition

- Should the existing Steering Committee be made the nucleus of the permanent Centre governing board?
- How should new members be selected and what should their qualifications be?
- Should the membership in the new board or committee be broadened to include industry, commerce and manpower planning expertise? If RECSAM hopes to get maximum support from non government Regional organisation it would appear prudent to have a few representatives on the board. A broader based committee would also create a wider recognition and interest in RECSAM. (This philosophy was agreed to at the second meeting in Bandung)
- How long should a Steering Committee member serve? Should there be criteria for evaluating his effectiveness?
- Would it be prudent to rotate members periodically, say every two years (insurint and only one member from each country was replaced) so that a broad base of knowledge and interest in RECSAM was eventually created in each Member country?
- Should the Centre Director be a member of the Committee?
- If so should he be a voting or a non voting member?
- If not what should his role be as regards Steering Committee decisions and policy guidelines affecting him?

CHAIRMANSHIP

- How should the Chairman be chosen? Must he be approved by SEAMES & SEAMEC?
- Would it be prudent to rotate the chairmanship of the committee (say every two years) among the member countries.
- What is the specific responsibility of the Chairman as regards operation of the Centre?
- How does he handle unusual policy matters? Via referendum to the rest of the committee? Personal decision? etc.

SUMMARY

Keeping the basic philosophy of the Centre in mind namely, that it is regional in scope, not related to any government or an international legal entity, it would appear that a group analogous to the "Board of Directors" of a corporation, with the Centre Director a participating member (but not the Chairman) and with the chairmanship rotated periodically would be a possible solution. The undersigned believes it most important that an active and progressive board, with deep concern for the Centre's success be established and becomes operational as soon as the Centre becomes a legal entity and has a permanent Director. It is suggested that the Chairman of the existing Steering Committee visit AIT in Bangkok and obtain information on the functions of their Board of Trustees. Perhaps this information would provide the basis for developing a definite set of terms of reference for the Steering Committee of RECSAM.

(T.B. SLATTERY)
Consultant to RECSAM

APPENDIX 15

Sixth Meeting of the Steering Committee
of the Regional Centre for Education
in Science and Mathematics

DISCUSSION PAPER - STUDENT SELECTION FOR FUTURE RECSAM COURSES

Introduction

Based on limited observation to date (primarily the BSCS courses and Government of Malaysia sponsored courses) and need exists to set careful criteria for student selection. I suggest the following points be discussed and guidelines provided the future Centre Director.

Discussion Points

1) Course objectives should be clearly stated so that student qualifications can be carefully delineated.

2) Students should be selected on basis of what they can do when they return.

3) Screening should be done so that students that have already had the particular course do not repeat (this happened in one course).

4) The question raised of whether in depth Capital City Coverage (as is now most common) or wider rural participation should be encouraged. Concentrating on the former might be easier but would further widen the rural/urban gap.

5) The evaluation paper worked out jointly by John Adams and T.B. Slattery might be used to point out specific examples and also suggest some of these guidelines.

6) The problem of who select the student deserves attention. The National Co-ordinating Committee would hopefully request applications from non-government agencies (private schools, industry commerce) when appropriate and the final selections made strictly on qualifications, potential for future action and student interest.

7) A large country like Indonesia may need a greater representation of participants, whereas Singapore may need less.

ANNEXURES

ANNEXURE I

SIXTH MEETING OF THE STEERING COMMITTEE SINGAPORE - OCTOBER 21 - 24, 1969.

Report on Events and Activities for the Period July 1, 1968 to June 30, 1969.

This report is a summary of the various activities that the Project Office has taken part or organised during the nurturing period July 1, 1968 to June 30, 1969.

1. Meetings:

Fourth Meeting of the Steering Committee was held in Bangkok on November 7 - 9, 1968 at the Conference Auditorium National Library, Bangkok, Thailand - Report P5/SCMS/15.

Third Project Directors Meeting - November 12 - 15, 1968. This was attended by the Chairman of the Steering Committee, Special Adviser and the Programme Co-ordinator. Discussions were mainly on Special Funds and Fund Raising Plans.

Fourth SEAMEC Conference was held in Djakarta, Indonesia on January 7 - 9, 1969. This Conference was attended by the Chairman of the Steering Committee, Special Adviser and the Programme Co-ordinator. At this Conference the Ministers approved:

- THE PROGRAMME OF ACTIVITIES IN THE FINAL DEVELOPMENT PLAN P5/SCMS/14 WHICH WAS REFINED AS A RESULT OF THE FUNDING PRINCIPLES DECIDED BY THE COUNCIL AT ITS THIRD CONFERENCE AND WHICH WAS FURTHER MODIFIED IN THE LIGHT OF THE FUNDING PLAN PROPOSED BY THE HOST GOVERNMENT OF MALAYSIA.

- THE EXTENSION OF THE NURTURING PERIOD OF 1ST JULY 1968 AND ENDING ON 30TH JUNE 1969 TO 30TH JUNE 1970.

The Council supported:

- THE REQUEST BY THE STEERING COMMITTEE FOR AN ADDITIONAL BUDGET OF US$417,572 FOR THE SECOND PHASE OF THE NURTURING PERIOD, I.E. 1ST JULY 1969 TO 30TH JUNE 1970.

- THE FUNDING PLAN AS PROPOSED BY THE MALAYSIAN GOVERNMENT AND APPROVED THE FIVE-YEAR (1ST JULY 1970 - 30TH JUNE 1975) BUDGET OF:
  - (a) CAPITAL COSTS AND EQUIPMENT AMOUNTING TO US$2,830,000;
  - (b) OPERATIONAL COSTS AMOUNTING TO US$2,657,000 AND
  - (c) SPECIAL FUNDS AMOUNTING TO US$2,658,900

The Council supported and encouraged:

- THE ESTABLISHMENT OF NATIONAL CO-ORDINATING COMMITTEES IN EACH SEAMES COUNTRY TO ENSURE THAT CENTRE PROGRAMMES ARE PROPERLY LINKED TO NATIONAL SCIENCE TEACHING ACTIVITIES.

Fifth Meeting of the Steering Committee was held at the National Educational Centre, Tokyo, Japan, from March 31 - April 7, 1969 - Report P5/SCMS/16.

RECSAM was represented at the Fourth Regional English Language Seminar organised by RELC at Singapore on June 9 - 14, 1969, by Mr. J. D. Cardosa, Lecturer in English, Malayan Teachers' College, Penang.

2. Courses Held:

(i) Integrated Science Course at Alam Shah School, Kuala Lumpur, Malaysia from August 5 - 30, 1968, attended by 4 participants from SEAMEO countries with Malaysian participants.

(ii) Nuffield 'O' Level Courses in Biology, Chemistry, Physics held at the Malayan Teachers' College, Penang, Malaysia from August 19 - 30, 1968. This was attended by 15 participants from SEAMEO member countries (3 from each country) along with Malaysian participants.

(iii) Refresher Courses for 6th Form (Grades 12th and 13th) Teachers held at the University of Malaya, Kuala Lumpur, in Biology, Chemistry, Physics and Mathematics from April 7 - 18, 1969. These courses were attended by 16 participants from SEAMEO member countries. A short report of these courses is attached as Annexure I.

(iv) BSCS Philippine Adaptation Course - This course was organised by RECSAM in co-operation with the University of the Philippines, Science Education Centre and was held from May 23rd - June 13th, 1969 at RECSAM, Penang. It was attended by 23 participants and one observer. Certificates of Completion have been awarded for the participants of this course. A report of this is attached as Annexure II.

3. Workshops/Seminars organised by RECSAM

(i) Inter-Project Workshop discussions on the use of local flora and fauna in the region. Teaching of Biology in South East Asia held at RECSAM, Penang from June 2 - 4, 1969. This is the first Inter-Project Workshop organised by RECSAM in co-operation with BIOTROP - The Regional Centre for Tropical Biology, Bogor, Indonesia. A report of this Workshop is attached as Annexure III.

(ii) Primary Science Planning Workshop - This was organised by RECSAM in co-operation with the Department of Education of the Republic of the Philippines and was held at Manila from June 24 - 28, 1969. Please refer to Report PE/SCMS/17. ...

(iii) Primary Mathematics Planning Workshop - This was organised by RECSAM and was held at the Malayan Teachers' College, Penang from June 30 - July 3, 1969. Please refer to Report P5/SCMS/18. ...

3. Visits:

(i) Visit by Members of the Steering Committee and Programme Co-ordinator to Korea and the Republic of China from April 9 - 11, 1969. Please refer to Annexure IV. ...

(ii) Visit by Dr. (Mrs.) Le Tue Quang to Hong Kong. Please refer to Annexure V. ...

(iii) Pacific Science Inter-Congress - The Programme Co-ordinator attended the First Inter-Congress of the Pacific Science Association held in Kuala Lumpur from May 5 - 9, 1969 at the University of Malaya. A one day's Symposium on Science Education chaired jointly by Dr. Bentley Glass and Dr. Yoshinobu Kakiuchi, both members of RECSAM International Advisory Council, was held on the 7th of May, 1969. An account of this Symposium is being published by the Association through the Secretariat in Honolulu. A brief report on this Congress by the Programme Co-ordinator is given as Annexure VI. ...

ANNEXURE II

REPORT OF THE REFRESHER COURSES IN BIOLOGY, CHEMISTRY, PHYSICS AND MATHEMATICS FOR SIXTH FORM TEACHERS
April 7th - 19th, 1969.
HELD AT THE UNIVERSITY OF MALAYA, KUALA LUMPUR.

General

More than 80 senior teachers of Grades 12 & 13 attended these courses, including 16 participants from SEAMEO countries.

The philosophy of the course was to provide the participants a better understanding of each of the selected topics and the necessary experimental work needed for these topics rather than feature information.

Lecturers from the Faculty of Science & Faculty of Education of the University of Malaya conducted these courses.

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BIOLOGY

The biology course was conducted by the School of Biological Sciences, Faculty of Science, University of Malaya.

The topics covered were:

- Ecological energetics.
- The freshwater environment.
- Chemical and physical techniques in freshwater ecology.
- Lab and field exercises in chemical and physical techniques for freshwaters.
- Sampling freshwater organisms.
- Freshwater communities.
- Practical and field exercises in sampling freshwater organisms.
- Climate and soil ecology.
- Sampling common terrestrial organisms.
- Lab and field exercises on climate and soil.
- Grassland/Belukar Habitat.
- Use of quadrats in population study (including invastion, colonisation and population growth)
- Field work on Grassland/Belukar Habitat Quadrats.
- Malayan biomes.
- Keys to the identification of common organisms in selected habitats.
- Interpretation and presentation of ecological data I.
- Interpretation and presentation of ecological data II.
- Lab teohniques in the interpretation and presentation of data.
- Fine structure of cells.

- Cell Function.
- Lab work on fine structure of cells.
- Gene action.
- The genetic code.
- Laboratory techniques in Drosophila and some plant genetics.
- Enzymes.
- Photosynthesis.
- Lab work with (a) enzymes and (b) Chromatography.
- Respiration.
- Energy and ATP.
- Lab work on respiration.

CHEMISTRY

The refresher course in Chemistry was conducted in the Department of Chemistry, Faculty of Science, University of Malaya.

The topics covered were:

Solids

Phase Equilibria for multi-component systems.

- Phase equilibria for single component systems.
- Electrical properties of solution.

A total number of 19 lectures/discussions of 1½ hours duration each were delivered by four members of the teaching staff of the Department of Chemistry. In addition to this, questionnaires and discussions on teaching methods were arranged by a staff from the Faculty of Education. A total number of 6½ practical periods of 3 hours duration per period were also conducted during the course.

The course was attended by 20 participants, out of which 5 were from overseas (3 from Indonesia, at present teaching at schools in Kuala Lumpur, 1 from the Philippines, 1 from Thailand and 1 from Vietnam.)

The main general topics of lectures covered are summarised as:

- Electrical properties of solution.
- Atomic structure, periodic properties and chemical bonding.
- Chemical kinetics.
- Properties of liquids.
- Properties of solids.
- Nuclear chemistry.
- The principles of polymerisation.

In each of the above main topics, the approach adopted was to present a coherent and logical presentation of each main topic so as to form a unit course in itself rather than to pick up sub topics. The practical course, illustrated material covered in the lectures, e.g. organic and inorganic models, films on topics of useful techniques. A tour of the general and research laboratories, including demonstration on the use of some of the instruments for physical methods of analysis was a fitting conclusion.

PHYSICS

The refresher course for Physics was conducted by the Department of Physics of the Faculty of Science, University of Malaya.

The following topics were covered:

- Laboratory/Organisation.
- System of Units.
- The Electron
  Problems & Discussion.
- Quantum Theory - photoelectric effect - Planck's constant .
  Problems & Discussion.
- Related Teaching Methods on Electron & Quantum Theory.
- Atom - Alpha particle scattering, Moseley's experiments & simple explanation of line spectra.
- X-Rays production & properties, diffraction, Bragg's Law.
- Radioactivity - alpha, beta particles, simple absorption and intensity measurements safety, precautions.
  Cloud chamber - biological effects on ionising radiation, isotopes.
- Methods of teaching of Radioactivity.
- Nuclear Physics - atomic nons. & mass nos.
- Radioactive decay, artificial radio isotopes & uses.
- Nuclear Physics - mass energy relation - mass defect; bonding energy, energy from fission 7 fusion.
- Methods of teaching of Nuclear Physics and other related topics.
- Tour of laboratories and research projects.

MATHEMATICS

The refresher course in Mathematics was conducted by the Department of Mathematics, University of Malaya.

The emphasis on statistics was on the appreciation of methods, use of methods, interpretation of statistical data, practical work and inference rather than were mechanical calculation.

The course on numerical analysis introduce the teachers to elementary computer mathematics.

The topics covered were as follows:

- Set Theory, Sample Spaces, Events.
- Numerical methods for findig real roots of an equation.
- Methods of teaching of statistics.
- Probability Measures, Frequency Interpretation, sampling.
- Numerical Methods for solving polynomial equations.
- Average & expectations, Mean & median.
- Problems solving & practical statistical work.
- Variance and standard deviation.
- Finite differences.
- Teaching methods on statistics.
- Problems solving and practical work including statistics.
- Laws of probability including conditional probability.
- Theory of Interpolation.
- Random variables, Probability distribution.

An attempt was made to deal systematically with the fundamental concepts of Statistics and Numerical Analysis. At the same time advantage was taken of the University's Computer Centre to introduce some of the basic ideas of computers and their programming.

Regarding Statistics, a lot of the time was devoted to Probability Theory as it is impossible to understand the former without a good grasp of the latter. The teachers were acquainted with Probability on the intuitive level only i.e. on the bais of coin-tossing and card-selection. An axiomatic treatment was tried and the power and advantage of which was quickly appreciated by participants when it was able to dispose of many of the puzzling classical paradoxes.

In Numerical Analysis, the traditional method was chosen as a novel treatment would be too advanced.

The computing part was new to almost everyone and it was felt that the participants profited a lot from their attempts at the actual solution of various problems on the electronic computer.

It is suggested that some topics for future treatment, should include linear and non-linear programming, the theory of games and the theory of graphs.

SEAMEC Regional Centre for Education in Science and Mathematics

Participants from SEAMEC Member countries for the Refresher Course in Science and Mathematics
April 7th - 18th, 1969.
at University of Malaya.

Name	Special Field	Address
PHILIPPINES		
1. Umila Benwardo V.	Mathematics	College of Education, University of Philippines, Quezon City, Philippines.
2. Mrs. Milagros P. Ocampo	Chemistry	College of Pharmacy, The Philippine Women's University, Manila, Philippines.
3. Mrs. Julia F. Climaco	Biology	Zamboanga Normal College, Zamboanga City, Philippines.
4. Miss Nenita P. Sornito	Physics	West Visayas State College, Iloilo City, Philippines.
SINGAPORE		
1. Mr. S. Natarajan	Biology	Raffles Institution, Singapore 7, Singapore.
2. Mr. A.N. Balagopal	Physics	Gan Eng Seng School, Anson Road, Singapore 21, Singapore.
3. Mr. Lim Chee Lin	Mathematics	Raffles Institution, Bras Basah Road, Singapore 7, Singapore.

Name	Special Field	Address
THAILAND		
1. Mrs. Prapai Thebtarathana	Chemistry	Saipunya School, Krungkasem Road, Bangkok, Thailand.
2. Miss Chamroon Poothai	Physics	Supervisory Unit, Department of Secondary Education, Ministry of Education, Bangkok, Thailand.
3. Miss Tiny Anakasant	Biology	Supervisory Unit, Department of Secondary Education, Ministry of Education, Bangkok, Thailand.
4. Miss Porntip Wungchana	Mathematics	Yothikurana School, Bangkok, Thailand.
VIETNAM		
1. Mrs. Tran Kim Hanh	Biology	Faculty of Pedagogy, 211 Cong Hoa, Saigon, Vietnam.
2. Ly-Cong-Can	Physics	Faculty of Pedagogy, 211 Cong Hoa, Saigon, Vietnam.
3. Nguyen Sam	Chemistry	Chu van On High School, Saigon, Vietnam.
4. Cam Duy Le	Mathematics	235 Cong Hoa Street, Saigon, Vietnam.

ANNEXURE III

REPORT OF THE BSCS PHILIPPINE ADAPTATION COURSE HELD AT RECSAM PENANG

MAY 23RD - JUNE 13TH, 1969

II. COURSE DESCRIPTION

The RECSAM BSCS Philippine Adaptation course was held at Regional Centre for Education in Science and Mathematics, Penang, Malaysia from May 23rd - June 13th, 1969.

The course was under the direction of Dr. Dolores F. Hernandez, Director, Science Education Centre, University of the Philippines, Quezon City, Philippines, assisted by Mrs. Vicenta Reyes, Biology Work Group, Science Education Centre, University of the Philippines. Dr. Victor Larsen, Adelphi University, Garden City, New York served as Consultant to the project. Except for field trips all sessions of the course were held in the theatre and Science laboratories of the Malayan Teachers' College, which also provided dormitory facilities for the participants.

Twenty-three participants and one observer attended the course. Refer Annexure I their names, addresses, and dates of attendance are listed subsequently.

Opening ceremonies were held at 9.30 a.m. on May 23rd. These included addresses by the Programme Co-ordinator for RECSAM, Mr. C. Ganasalingam and Dr. Hernandez. The major address was given by Tuan Haji Hamdan bin Sheikh Tahir, Chief Education Adviser, Ministry of Education, Malaysia, who declared the course to be officially opened.

The two overall major objectives of the course were:

1. to acquaint the participants with investigatively oriented approaches to teaching secondary school biology.
2. to provide opportunities for participants to evaluate investigative teaching methods for possible adaptation to their own teaching programmes.

Five areas of instruction were included in the schedule:

1. Professional methods in Biology Education
2. Inquiry Oriented Laboratory Exercises and Demonstrations
3. Content-oriented Topics and Materials
4. Field Trips
5. Participant Developed Professional Activities

A list of materials presented, organized under these headings follows:

Professional Methods in Biology Education
Topics Discussed

1. History of Development of the Philippine BSCS Adaptation Programme and Science Education Centre
2. Evaluation of Student Performance
3. Analysis of Testing Procedures
4. Improvement of Tests
5. Improvement of Instructional Techniques
6. Behavioural Objectives
7. History of Staff Involvement in BSCS
8. Objectives of the BS[illegible]
9. Nine Basic Themes of [illegible] courses
10. Levels of Biological Organization
11. Test Construction Techniques
12. Discussion of BSCS Materials:
    a. The Laboratory Blocks
    b. Innovations in Equipment and Techniques for the Biology Teaching Laboratory
    c. Patterns and Processes (BSCS course for academically disadvantaged)
    d. Interaction of Experiments and Ideas (BSCS second course)
    e. Research Problems in Biology
    f. The Green, Yellow and Blue Versions of the BSCS
    g. Invitations to Inquiry
    h. BSCS Single Topic Film
    i. Single Topic Slides
13. Objectives for Student Working within an Investigative Framework
14. Devising Inquiry-oriented Laboratory Exercises

Laboratory Exercises and Demonstrations Performed

BSCS Exercises: Philippine BSCS Adapted Laboratory Manual

1. Exercise 1.2 An Experiment: The Germination of Seeds
2. Exercise 1.3 Interrelationships of Producers and Consumers
3. Exercise 2.1 Population Growth: A Model
4. Exercise 4.1 Structural Characteristics in the Classification of Animals
5. Exercise 4.2 The Levels of Classification
6. Exercise 5.3 Diversity in the Plant Kingdom
7. Exercise 6.1 A Garden of "Microorganisms"
8. Exercise 9.2 Succession in Freshwater Communities: A Laboratory Study
9. Exercise 9.3 Effects of Salinity on Living Organisms
10. Exercise 10.1 The Comparison of Form
11. Exercise 11.1 Some Characteristics of Living Matter
12. Exercise 11.2 Diffusion Through A Membrane
13. Exercise 11.3 Inside a *Hydrilla* Leaf
14. Exercise 11.6 Mitosis
15. Exercise 12.1 Extraction and Separation of Pigments from Green Leaves
16. Exercise 12.2 Factors Affecting Enzyme Activity
17. Exercise 12.3 Digestion of Starch by a Plant Enzyme
18. Exercise 15.1 Patterns of Mendelian Inheritance

Additional Laboratory Exercises and Demonstrations:

1. Culturing slime mould (*Physarum polycephalum*) plasmodium
2. Yeast cultures under Aerobic and Anaerobic Conditions, An Experiment on Respiration
3. Demonstration of Onion Root Tip Growing

4. Techniques of Fixing, Sectioning, Squashing, Staining, and Mounting Cells
5. Preparation of Slides of Onion Root Tips Showing Mitosis
6. Determining Diffusion Pressure Deficit of Potato Cells
7. Testing for Seed Viability - The Tetrazolium Test
8. Chromatography
9. Demonstration - A Model of Pressure Flow
10. Demonstration of a Respirometer

Content Oriented Topics and Materials

1. Water Relationships of Plant Cells.
2. Membrane Permeability
3. Instrumentation - Introduction to Optical Microscopy
4. Construction of a Dichotomous Key
5. The Use of the Chi-Square in Test Analysis of Biological Data
6. Photosynthesis
    a. Investigative Approaches
    b. Light and Dark Reactions
    c. Limiting Factors
    d. Use of Isotopes in Research
    e. Leaf Adaptations
7. Cytological Problems Associated with Latex Formation
8. Mass Flow and Phloem Transport
9. Rf from an Experimental Viewpoint
10. Patterns of Diversity of Living Things
11. The Functioning Animal with emphasis on Biochemistry of Respiration
12. Discussion of Answers to Guide Questions and Problems at the end of each of the assigned Chapters of the Text (Chapters 1, 2, 3, 4, 5, 6, 13, 14, 20 in the text were assigned for participant study).

Field Trips

1. AKUARIUM Tunku Abdul Rahman
   Penang - (Emphasis on Research programmes for pond culture of freshwater prawns)

2. Rubber and Oil Palm Estates

   Henrietta Estates
   Padang Serai
   Kedah, Malaysia

3. School of Agriculture

   Bumbong Lima (Field testing of various varieties of rice)
   Province Wellesley
   Penang

4. School visits

   a. St. Georges Girls' School
   b. Penang Free School
   c. Methodist Boys' School
   d. Methodist Girls' School

   Each school was visited by a team composed of participants from each of the member countries to observe laboratory classes in Biology being taught.

5. Tour of Science Laboratories of Malayan Teachers' College conducted by Mr. C. Ganasalingam.

Participant Developed Activities

1. Demonstration of Determination of Diffusion Pressure Deficit (Mr. Saran Singh Sekhon)

2. Demonstration of an exercise on Enzyme Activity (Mr. M. C. Jacob)

3. Discussion of Test Items prepared by participants

4. Discussion of Participant - Generated Laboratory Exercises

A questionnaire was distributed to participants to find at the end of the course their reactions to the course and what they had gained from it. Participants were also asked how the various topics that they had experimented would be used for teaching biology in their schools and the adaptation that has to be done for this. A second follow up questionnaire (Annexure) for evaluation has now been prepared by Mr. John Adams of the Peace Corps and this will be distributed soon to the participants. It is proposed to try out a evaluation study on this. Certificates of completion have been prepared and are ready for distribution.

PARTICIPANTS TO BSCS BIOLOGY ADAPTATION COURSE

INDONESIA

Mr. Sudardjo,
S.M.A. Negeri No. III,
Jogjakarta.

Mr. R. Suprapto,
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Miss Noerhaida Soedirman,
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MALAYSIA

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Enche Mohd. Kamil b. Hassan,
Sekolah Menengah Raja Tun Uda,
Penang.

Mr. Saran Singh Sekhon,
E.P.R.D.,
Ministry of Education,
Kuala Lumpur.

Mr. Chin Fook Kong,
Methodist Girls' School,
Ipoh.

PHILIPPINES

Mr. Demetrio D. Monis,
Quezon City Science High School,
Quezon City,
Philippines.

Mrs. Milagros M. Palomaris,
Jose Abad Sanitos High School,
Manila,
Philippines.

Mrs. Lorenza Mamaril,
Bureau of Vocational Education,
Manila.

Mr. Virgilio B. Aguilar Sr.,
St. Mary's College,
Bayombong, N.V.
Philippines.

THAILAND

Mrs. Rojanee Janopas,
Trium College,
Phayathai Road,
Bangkok.

Miss Tiny Anakasant,
Secondary Supervisory Unit,
Ministry of Education,
Bangkok.

Mr. Whan Julmun,
Thavithaphisak School,
Bangkok Yai Thonburi,
Thailand.

Mr. Wonnit Wongsa-nga,
Suankularb School,
Bangkok,
Thailand.

SINGAPORE

Mr. Chong Chai Tet,
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Singapore 10.

Mrs. Betty Tan Tin Neo,
Raffles Girls Secondary School,
Anderson Road,
Singaporo 10.

Mr. M.C. Jacob,
Bartley Secondary School,
Bartley Road,
Singapore 13.

Mrs. L.K. Sigamoney,
Ministry of Education,
Kay Siang Road,
Singapore 10.

VIETNAM

Mrs. Tran Kim Hanh,
Faculty of Pedagogy,
University of Saigon,
Saigon,
Vietnam.

Mr. Nguyen Van Bang,
Demonstration School
(Trung-Hoc Kieu-Mau),
Hue,
Saigon,
Vietnam.

Dr. (Mrs) Tran Ngoc Tieng,
Faculty of Science,
University of Saigon,
Saigon,
Vietnam.

Miss Chau Thi Ngan,
Le-v-Duyit High School,
Saigon,
Vietnam.

BSCS ADAPTATION COURSE

Questionnaires prepared by Mr. John Adams, U.S. Peace Corp, Malaysia.

Nearly 4 months have passed since the end of the BSCE course. In that time there has probably been some reflection by the participants on the worth and organisation of the material covered, and by now perhaps many of them have had a chance to estimate how valuable the course was to them and how much of it can be put to use.

It is information such as this that will be important in planning future courses.

1. Looking back on the cours how successful do you feel it was in providing you with new ideas?

2. What did the course give you, if anything, that you consider valuable?

3. What methods, ideas experiments, theories, or etc. which you got from the course are you using now, if any?

   a) How 'have you been able to)
   (are you) using these things (as in classroom teaching, planning, organized discussions, or etc.)?

4. What parts of the course were:
   Most beneficial to you?

   Least beneficial to you?

5. Do you have BSCS books available to you, as in your possession or in the school library?

6. What are the main modification you feel would be required to adapt a method like BSCS to your country?

7. During the course, did you have time to talk about the material being covered with participants from other countries?

   a) Did you, in talking with foreign participants, find their comments or suggestions helpful to your situation?

   b) How do you feel the problems in teaching science in your country compare with those of the other participating countries?

8. If given the opportunity, would you like to take a sequel course to study more about BSCS?

9. What is your present occupational position?

a) If a teacher, what courses are you teaching?

10. Do you have any contact with other people who are acquainted with BSCS?

11. Did you have any particular problems during the course (such as language, science terms, time adjustments, or etc.)?

13. How did the course meet your expectations?

12. What are the main changes in science teaching you expect to see in your country over the next 5 years?

For teachers:

14. How many hours/week do you teach Biology?

15. What do your students write in your book (e.g. notes read or written on the blackboard, what they hear in a lecture, notes from a textbook, etc.)?

16. How are practicals and experiments conducted (demonstration, groups, individually, etc.)?

17. How much of class time is spent on discussion of material?

18. Do you have any student clubs or societies?

a) What kind of activities do they do?

19. How much homework do you give your students (average hours/week)?

20. Has experimental approach changed any results in your class?

BRIEF REPORT OF THE PACIFIC SCIENCE ASSOCIATION FIRST INTER-CONGRESS

*The First Inter-Congress of the Pacific Science Association was held in KualaLumpur, 5 - 9 May 1969. Host institution was the University of Malaya, which is the representative institution of the Association in Malaysia. Through the courtesy of the Vice-Chancellor of the University, Professor Ungku A. Aziz, and the efficient organization by the University's Liaison Committee under the chairmanship of Professor A. J. Berry, the meetings benefited by excellent accommodations and arrangements at the University.

*The Inter-Congress was the occasion for meetings of the Council of the Association, some of the Standing Committees, for seminars organized by Malaysian scientists, and for cooperative meetings by IBP groups. Participation by scientists from outside of Malaysia was limited to 100. Plans for the meeting were worked out between the Executive Committee of the Council (Dr. Roland W. Force, chairman) and the Liaison Committee.

*This First Inter-Congress was experimental in nature, designed primarily to provide for a meeting of the Council in the interim between the Eleventh and Twelfth Pacific Science Congresses. However the experiment was judged a fruitful one, the smaller scope of the meeting allowing greater contact among the Standing Committee chairman, and between the chairmen, the Council, and the organizers for the Twelfth Congress. It is hoped that the Council will, at the Twelfth Congress in 1971, receive invitations from member countries and areas of the Association interested in hosting the Second Inter-Congress, the probable date of which would be in 1973.

Standing Committee on Science Education

This Standing Committee on Science Education held a Symposium on Science Education which was chaired jointly by the two Co-Chairmen, Dr. Bentley Glass and Dr. Yoshinobu Kakiuchi. The following were co-opted as Members of the Organizing Committee of the Science Symposium.

Dr. Bentley Glass, - Chairman
State University of New York,
at Stony Brook.

Dr. Yoshinobu Kakiuchi, - Chairman
Institute for Solid State Physics,
Tokyo.

Dr. Nokolaski of U.S.S.R.,
Research Scientist in Fresh
Water Biology.

Dr. Augusto Tenmatay,
University of the Philippines.

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*Quoted from Information Bulletin of Pacific Science Association
Vol. 21, Nos. 1 - 3, February - June 1969

Dr. Pradith Cheosakul,
National Research Council,
Thailand.

Dr. Sim Wong Kooi,
Dean, Faculty of Education,
University of Malaya,
Kuala Lumpur.

Dr. P. C. Vohra,
School of Biological Sciences,
University of Malaya,
Kuala Lumpur.

Dr. David G. Morgan,
Australian Academy of Science
School Biology Project.

Mr. C. Ganasalingam,
Programme Co-ordinator,
RECSAM,
Penang.

The aims of the Symposium was spelt out by the Co-Chairman, Dr. Bentley Glass as follows:-

(i) To provide a good curriculum for training teachers for the local educational system.

(ii) To provide adequately for training sufficient numbers of Science Teachers.

(iii) To provide Science Education Centres to retrain science teachers continuously as a regular part of their annual duty.

(iv) To send a sufficient number of the best advanced students abroad to engage in scientific study.

(v) To supply posts and research facilities in sufficient attraction to bring most of these scientists home.

(vi) To establish an agency to make a continuous study of the relevance of new scientific discoveries to the social and economic and health needs of their own country and culture.

A brief report of the Symposium held at the Conference Room of the Faculty of Education, University of Malaya attended by about 20 persons which included Members of the Steering Committee is given below.

Session I - Teacher Training and Science Curriculum

The first topic on a suitable curriculum for training science teachers was given by Dr. Augusto Tenmatay, University of the Philippines, who outlined the new teacher training programmes for science teachers based on content, inter-disciplinary, social aspects of the exploration of science knowledge. An evaluation technique was also being developed. Some experiments on micro-teaching are being carried out. A series of summer institutes have been developed under the auspices of the National Science Development Board, University of the Philippines Science Education Centre and the Bureau of Public Schools.

A report on the SEAMEO Regional Centre for Education in Science and Mathematics, Penang, was given by Mr. C. Ganasalingam the Programme Co-ordinator.

Mr. David G. Morgan, Australian Academy of Science School Biology Project, gave a brief account of the Australian school system and then outlined the BSCS Adaptation that Australia had carried out in introducing a new biology curriculum. This has been prepared by the Australian Academy of Sciences - School Biology Project. The following materials have already been prepared and distributed to various schools in Australia.

Biological Science Web of Life	Price	-	A$3.90
Teachers Guides and	"	-	1.10
Laboratory Manual	"	-	1.10
Laboratory Guide	"	-	2.20

Dr. Nokolaski of U.S.S.R. outlined his country's system of education as follows:-

Elementary School	-	4 - 5 years
Secondary School	-	4 - 5 "
Technical Institute	-	4 "

Students then proceeded on to Pedagogical Institutes and Universities for added professional qualifications.

Dr. Bentley Glass then talked on the provision of sufficient numbers of science teachers indicating that 1% of the population should at least be scientists or engineers. This is expected to double every decade. It was important that the role of science teaching in schools, teacher training institutions and universities was geared to meet this demand for an increase of science teachers. He then outlined how Science Education Centres could be used for continuous retraining of science teachers so that the teachers could meet the challenge of explosion of scientific knowledge.

Session II - Training of Scientists

Dr. Yoshinobu Kakiuchi then outlined how scientists in developing countries could study in advanced fields of science in developed countries. It was important to ensure that these students returned to their home countries after their advanced studies abroad. Conditions must be so designed that there are ample opportunities for this elite group to work on profitable research work in their countries and prevent this so-called brain-drain.

Dr. Pradith Cheosakul outlined the plans of the National Research Council of Thailand in providing advanced courses both in Thailand and abroad. All research workers going for advanced study abroad have to return to Thailand and work in their respective institutions. The promotion and progress of these research institutions were co-ordinated by the National Research Council of Thailand.

* An account of the Council meetings, Resolutions, and the formal sessions of the First Inter-Congress, including summaries by Standing Committees of their meetings, will be published by the Association through the Secretariat in Honolulu.

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* Quoted from Information Bulletin of Pacific Science Association Vol. 21, Nos. 1 - 3, February - June 1969

ANNEXURE E

Refresher Course for Sixth Form Teachers
General Information for SEAMEC Participants -
(other than from Malaysia)

I. General

The proposed refresher courses on Biology, Chemistry, Mathematics and Physics would be held at the University of Malaya, Kuala Lumpur, from April 7th to 18th, 1969. Senior teachers of grades 12 & 13 are expected to be participants of these courses which would generally stress on the concepts and understanding of each of the selected topics and the necessary experimental work needed for these topics rather than mere factual information.

Some details of these courses are given as Annexure

B -- Biology Course
C - Chemistry Course
D -- Mathematics Course
E - Physics Course

Before the start of each of these courses participants would be provided with a list of reference and suitable reading materials, so that participants would be able to prepare themselves before attending the appropriate courses.

II. Practical Work

The following material would be issued to participants during the course.

(a) Instruction experimental sheets for reference and use in schools,

(b) Suggested list of apparatus and equipment that could be used for practical work by Sixth Form students,

(c) A list of audio-visual aids or demonstration equipment used during the course.

III. Lecturers

The staff of the Faculty of Science, University of Malaya would give lectures on the modern concepts of the selected topics and the staff of the Faculty of Education would give lectures on the suggested teaching methods of Sixth Form pupils on each of the appropriate topics.

IV. Scholarships

Scholarship terms offered by the SEAMEC Regional Center for Education in Science & Mathematics for nominated participants from SEAMEC countries other than from Malaysia.

Each participant would receive the following:-

(a) Economy class international airfare from capital city in home country to Penang or Kuala Lumpur and back.

(b) A stipend of US$ 75.00 for the course to meet board, lodging and other incidental expenses.

Full board and accommodation at the Training Centre, University of Malaya will be provided at a subsidised rate of about US$3.00 per day.

REFRESHER COURSE IN BIOLOGY BY THE UNIVERSITY OF MALAYA
APRIL 7TH - 18TH

1. Timetable for each day

The following timetable is proposed so that there will be a coffee break between 10.30 and 11.00 a.m. from Monday to Friday, and between 9.30 and 10.00 a.m. on Saturday and there will also be an extra ½ hour just before lunch. It is felt that a lunch break of 1½ hours is more than sufficient:

e.g. Tuesday 8th

8.30 - 9.30 a.m.	Lecture: "The freshwater environment"
9.30 - 10.30 a.m.	Lecture: "Chemical and physical techniques in freshwater ecology"
	Coffee break
11.00 - 12.30 noon	Lab and field exercises in chemical and physical techniques for freshwaters.
2.00 - 4.30 p.m.	Lab and field exercises in chemical and physical techniques for freshwaters.

2. Ecology

The topic Grassland/Belukar habitat is included so that schools can easily study an ecological habitat over a period of at least one complete school year. Freshwater habitats may not provide such an easy access and the failities to study them may not be available throughout the year.

The topic of quadrats is proposed because the new syllabus specifically states that "In the case of plants, detailed distribution maps may be prepared; permanent quadrats or other marked regions of the habitat would allow accurate records to be made throughout the year enabling precise appearance and distribution of plants to be recorded. Sampling data of animal abundance and distribution should be taken whenever practicable."

A Grassland habitat selected in one corner of the school field would provide an excellent condition for such study.

3. Identification

Simple keys to the identification of common organisms in selected habitats is proposed because of the fact that the main difficulty that teachers face in teaching ecology is the question of identification of plants and animals and as we are aware that literature in this direction is completely lacking as far as school teachers are concerned. The new Cambridge syllabus also states that "It is appreciated that in many oversea countries accurate keys for identification of animals do not exist. The difficulty should not be allowed to prevent work in the field. Possible help from University Departments and Departments of Ministries of Agriculture should not be overlooked."

4. Physiology

Under photosynthesis some lab work in chromatography is proposed. The reason for this is that chromatography is playing an increasingly important part in research and the school teacher is faced with problem of having to teach it in the school. Therefore an introduction to chromatography will be very useful indeed.

5. Ommission

It is proposed that microbial genetics and microbial methods be left out since the time available at the course is limited and the syllabus does not warrant including these areas in the course.

Proposed draft Programme for Biology Refresher Course by University of Malaya

Monday	7th Morning	Opening Ceremony
	2.00 - 3.00 p.m.	Lecture: "Ecological energetics"
	3.00 - 4.30 p.m.	Discussion on lecture topic
Tuesday	8th	
	8.30 - 9.30 a.m.	Lecture: "The freshwater environment"
	9.30 - 10.30 a.m.	Lecture: "Chemical and physical techniques in freshwater ecology"
	11.00 - 12.30 noon	Lab and field exercises in chemical and physical techniques for freshwaters.
	2.00 - 4.30 p.m.	Lab and field exercises in chemical and physical techniques for freshwaters.
Wednesday	9th	
	8.30 - 9.30 a.m.	Lecture: "Sampling freshwater organisms"
	9.30 - 10.30 a.m.	Lecture: "Freshwater communities"
	11.00 - 12.30 noon	Practical and field exercises in sampling freshwater organisms
	2.00 - 4.30 p.m.	Practical and field exercises in sampling freshwater organisms.

Thursday	10th	
	8.30 - 9.30 a.m.	Lecture: "Climate and soil ecology"
	9.30 - 10.30 a.m.	Discussion on lecture topic
	11.00 - 12.30 noon	Lecture: "Sampling common terrestrial organisms"
	2.00 - 4.30 p.m.	Lab and field exercises on climate and soil
Friday	11th	
	8.30 - 9.30 a.m.	Lecture: Grassland/Belukar Habitat
	9.30 - 10.30 a.m.	Discussion lecture topic
	11.00 12.30 noon	Lecture: Use of quadrats in population study (including invasion, colonisation and population growth)
	2.00 - 4.30 p.m.	Field work on Grassland/Belukar Habitat Quadrats
Saturday	12th	
	8.30 - 9.30 a.m.	Lecture: "Malayan biomes"
	10.00 - 12.30 noon	Keys to the identification of common organisms in selected habitats.
Monday	14th	
	8.30 - 9.30 a.m.	Lecture: "Interpretation and presentation of ecological data I.
	9.30 - 10.30 a.m.	Discussion on lecture topic
	11.00 - 12.30 noon	Lecture: Interpretation and presentation of ecological data II.
	2.00 - 4.30 p.m.	Lab techniques in the interpretation and presentation of data.
Tuesday	15th	
	8.30 - 9.30 a.m.	Lecture: "Fine structure of cells"
	9.30 - 10.30 a.m.	Discussion on lecture topic
	11.00 - 12.30 noon	Lecture: "Cell function"

Tuesday	15th		
		2.00 - 4.30 p.m.	Lab work on fine structure of cells
Wednesday	16th		
		8.30 - 9.30 a.m.	Lecture: "Gene action"
		9.30 - 10.30 a.m.	Discussion on lecture topic
		11.00 - 12.30 noon	Lecture: "The genetic code"
		2.00 - 4.30 p.m.	Laboratory techniques in *Drosophila* and some plant genetics.
Thursday	17th		
		8.30 - 9.30 a.m.	Lecture: "Enzymes"
		9.30 - 10.30 a.m.	Discussion on lecture topic
		11.00 - 12.30 noon	Lecture: "Photosynthesis"
		2.00 - 4.30 p.m.	Lab work with (a) enzymes and (b) Chromatography
Friday	18th		
		8.30 - 9.30 a.m.	Lecture: "Respiration"
		9.30 - 10.30 a.m.	Discussion on lecture topic
		11.00 - 12.30 noon	Lecture: "Energy and A T P"
		2.00 - 4.30 p.m.	Lab work on respiration

REFRESHER COURSE IN CHEMISTRY FOR SIXTH FORM TEACHERS

7th April, 1969 to 18th April, 1969

Proposed Syllabus for the Course

It is proposed that the programme planned should not attempt too much in the short space of time available for the course, but that attention should be confined to topics in Section II of the Higher School Certificate Chemistry (Alternative T) Syllabus, i.e. MATTER: STRUCTURE AND PROPERTIES, choosing certain relevant topics that may normally prove rather more difficult to teach in schools.

Proposed Topics taken from the Higher School Certificate Chemistry (T) syllabus:

Solids

Phase Equilibria for multi-component systems.

Phase equilibria for single component systems

Electrical Properties of Solutions.

Proposed Treatment of Topics:

1. Emphasis should be on Practical Work. As far as possible, suitable experiments would be designed to illustrate certain concepts for better understanding, e.g. when discussing the vapour pressures of immiscible liquids, a practical investigation on the steam distillation of a commercial sample of citronella oil is highly desirable. Indeed, the investigation would precede the discussion of the "theory."

2. A maximum amount of audio-visual aids is to be used, particularly during lecture periods as follows:

   Film slides, film strips, 8 mm film loop cassettes, over-head projector, epivisor, sound film projector, charts and so on.

3. Teachers would be made aware of the desirability of using, as far as possible, simple apparatus for group or individual work in the laboratory school, for example, the readily available filter paper for simple chromatographic work, etc.

REFRESHER COURSE IN STATISTICS AND ELEMENTARY NUMERICAL ANALYSIS

The emphasis on statistics will be on the appreciation of methods, use of methods, interpretation of statistical data, practical work and inference rather than mere mechanical calculation.

The course on numerical analysis is to introduce the teachers to elementary computer mathematics and to enable them to use the University's computer to solve some problems.

SUGGESTED TIME-TABLE

Monday:	7th April	9.00 - 10,00	Opening Ceremony
		10.30 - 11.30	Set Theory, Sample Spaces, Events
		11.30 - 12,30	Numerical methods for finding real roots of an equation
		2.00 - 3.15	Methods of teaching of statistics
		3.15 - 4.30	Problem solving and discussion
Tuesday:	8th April	8.30 - 9.30	Probability Measures, Frequency Interpretation, sampling
		9.30 - 10.30	Numerical Methods for solving polynomial equations
		11.00 - 12.30	Average & expectations, Mean & median
		2.00 - 3.15	Problem solving & practical Statistical work
		3.15 - 4.30	Problem solving & practical Statistical work
Wednesday:	9th April	8.30 - 9.30	Variance and standard deviation
		9.30 - 10.30	Finite Differences
		11.00 - 12.30	Teaching methods on statistics
		2.00 - 4.30	Problem solving and practical work including statistics.
Thursday:	10th April	8.30 - 9.30	Laws of probability including conditional probability
		9.30 - 10.30	Theory of Interpolation
		11.00 - 12.30	Random variables, Probability distribution
		2.00 - 4.30	Problem solving and practical work including statistics

Friday:	11th April	8.30 - 9.30	Binomial Distribution
		9.30 - 10.30	Lagrange's Interpolation Formula Inverse interpolation
		11.00 - 12.00	Continuous distribution Frequency & Cumulative frequency
		2.00 - 4.30	Problem solving and practical work
Monday:	14th April	8.30 - 9.30	Normal distribution including use of tables
		9.30 - 10.30	Numerical Differentiation
		11.00 - 12.30	Teaching methods on statistics
		2.00 - 4.30	Problem solving & practical work
Tuesday:	15th April	8.30 - 9.30	Presentation of statistical data, sampling distributions
		9.30 - 10.30	Numerical Integration
		11.00 - 12.30	Properties of a good estimate Interval estimation
		2.00 - 4.30	Problem solving & practical work
Wednesday:	16th April	8.30 - 9.30	Significance Testing, Quality control by means and ranges
		9.30 - 10.30	Numerical solutions of ordinary differential equations
		11.00 - 12.30	Fortran Programs, Flow Charts
		2.00 - 4.30	Programming Concepts, Computer equipment
Thursday	17th April	8.30 - 9.30	Two sample & paired sample t-test
		9.30 - 10.30	Problem solving & discussion
		11.00 - 12.30	(Programmes on Statistics & Numerical analysis)
		2.00 - 4.30	
Friday:	18th April	8.30 - 9.30	Ideas of Association, Rank correlation (Kendall's)
		9.30 - 10.30	Practical work on rank correlation
		11.00 - 12.00	(More programs on statistics and numerical analysis)
		2.00 - 4.00	

Note: Coffee break from 10.30 - 11.00 a.m. from Tuesday onwards.

9. Cathode ray oscilloscope. Lissajou's figures, calibration of signal generator, valve characteristics curve and transistor characteristic curve.

10. Standing wave forms of a string.

11. Photoelectric effect.

12. Scalar. Characteristics of a Geiger-Muller tube and the range of B-particles in air. (Use of Labgear Radioactivity Demonstration Set)

13. A.C. Bridge: Conductivity of an Electrolyte.

14. Wulf electroscope: Range of α-particles in air.

15. Measurement of e/m for electrons.

16. Demonstration experiments 1.

17. Demonstration experiments 2.

18. Cloud Chamber experiments.

Note: Experiments 8-17 were originally proposed by you and experiments 1-7 and 18 have been included by us.

REFRESHER COURSE IN PHYSICS (T)

Monday:	7th	9.00 - 10.00 a.m.	Opening Ceremony
		10.30 - 11.30	Laboratory Organisation
		11.30 - 12.30	System of Units
		2.00 - 4.30 p.m.	Practical work
Tuesday:	8th	8.30 - 9.30 a.m.	'The Electron'
		9.30 - 10.30	Problems & Discussion
		11.00 - 12.30	Practical
		2.00 - 4.30 p.m.	Practical
Wednesday:	9th	8.30 - 9.30 a.m.	'Quantum Theory' - photoelectric effect - Planck's constant
		9.30 - 10.30	Problems & Discussion
		11.00 - 12.30	Related Teaching Methods on Electron & Quantum Theory
		2.00 - 4.30	Practical
Thursday	10th	8.30 - 9.30 a.m.	'The Atom' - Alpha particle scattering, Moseley's experiments & simple explanation of line spectra
		9.30 - 10.30 a.m.	Discussion
		11.00 - 12.30	Practical
		2.00 - 4.30 p.m.	Practical
Friday:	11th	8.30 - 10.30 a.m.	Practical
		11.00 - 12.30	Practical
		2.30 - 4.30 p.m.	Practical
Saturday:	12th	8.30 - 10.30	Practical
		11.00 - 12.30	Practical
Monday:	14th	8.30 - 9.30	'X-Rays' production & properties, diffraction, Bragg's Law.
		9.30 - 10.30	Discussion
		11.00 - 12.30	Practical
		2.00 - 4.30	Practical
Tuesday:	15th	8.30 - 9.30	Radioactivity alpha, beta particles, simple absorption & intensity measurements safety, precautions,
		9.30 - 10.30	Discussion
		11.00 - 12.30	Practical
		2.00 - 4.30	Practical

Wednesday:	16th	8.30 - 9.30	Radioactivity (contd.) Cloud chamber-biological effects of ionising radiation, isotopes.
		9.30 - 10.30	Discussion
		11.00 - 12.30	Methods of teaching of Radioactivity.
		2.00 - 4.30	Practical
Thursday:	17th	8.30 - 9.30	Nuclear Physics - atomic nos. & mass nos. Radioactive decay, artificial radio isotopes & uses.
		9.30 - 10.30	Discussion
		11.00 - 12.30	Practical
		2.00 - 4.30	Practical
Friday:	18th	8.30 - 9.30	Nuclear Physics (contd.) Mass-energy relation - mass defect; bonding energy, energy from fission & fusion
		9.30 - 10.30	Discussion
		11.00 - 12.30	Methods of teaching of Nuclear Physics and other related topics
		2.00 - 4.30	Tour of laboratories and Research Projects.

Note: Coffee break from 10.30 - 11.00 a.m. from Tuesday onwards.

SUGGESTED PRACTICAL WORK

1. Demonstration Experiments by using mechanical and electrical apparatus on free, damped and forced oscillations and resonance.

2. Practical on use of gratings for measuring wavelengths of spectra.

3. Demonstration methods of detection of ultraviolet and infra-red radiation.

4. Exp. determination of magnetic flux and magnetic flux density either by means of induced e.m.f.. or by calibrated ballistic galvanometer (or flux meter) and search coil or by force on a current.

5. Demon. Exp. in terms of oscillographs, on the effects of resistance, capacitance and induction on current and power when each is connected separately to an AC supply.

6. Use of Van de Graff machine.

7. Exp. on properties of cathode rays.

8. Spectral analysis of Na, Hg, Cd & Ne. Rydberg constant-hydrogen discharge.

ANNEXURE 6

Draft Report of the
Inter-Regional Project Workshop Discussions on
the Use of Local Flora and Fauna in the
Teaching of Biology in the Southeast Asian Region
2nd - 4th June, 1969.
SEAMEC, RECSAM, Penang.

Introduction

Initial part of the discussion was devoted to the formulation of a specific program or guideline for the workshop, hopefully geared to the attainment of the Project goals which are set out by RECSAM. The workshop addressed itself to a review and scrutiny of the main points, as outlined in the RECSAM invitational letter (RCP/A/50 annexure B refers).

The preliminary decision on the deciding issues were as follows:-

1. It was resolved that the deliberations would be centered on the needs of the Secondary or High School biology teaching (and learning) in this Region. In due course, it is hoped that any measure of success attained at this level could have its multiplicity effect on the future development of both primary (elementary) and tertiary biology education,

2. With respect to the writing of a "Biology Text ... using local flora and fauna of SEA Region," it was decided that in the order of priority, the workshop should first of all stress the crucial need for the compilation of biology resource materials (local flora and fauna) from member countries in this Region. Arising from the use of the selected variety of local instructional resource materials, it is implicit that these could possibly form a catalyst for the eventual development of a framework within which a kind of "Biology Text" may then be formulated. Such an endeavour should continue to be the collective and cooperative efforts of Teachers, Educators and Research Scientists from member countriew in this Region. It is envisaged that when this stage of progress is reached; maximum utilization of both the resources and expertise of BIOTROP Organisation in Bogor, Indonesia should be called upon to assist RECSAM in the preparation of the "Text."

3. It was agreed that in view of the diversity of Biology syllabi in this Region, the Workshop would not make specific reference to any syllabus _per se_. Rather, it would emphasise the curcial areas within the biology curriculum for which it is deemed to have an urgent need for the inclusion and use of distinctive local flora and fauna in the school biology instruction.

4. The operational description of "local flora and fauna" is taken to mean both the micro-and-macro living organisms of the awuatic and terrestrial environments which characterise each member country in this Region.

Objectives

The operational guideline identified for the three day Workshop was as follows:-

To develop and prepare guidelines for:-

i) the identification of local flora and fauna in this Region which have distinctive usefulness for application in schools in member countries,

ii) the compilation of such resource materials ultimately so that they may be maximally utilised by teachers in schools to enrich the teaching and learning of local biology.

The Workshop cautioned that the resource materials thus compiled should be critically edited (by RECSAM personnel) so that the information available are organised and structured, readily useable by teachers in the class instruction. At no stage should the diversity of local flora and fauna (from this Region) be a conglomerate taxonomic listing of organisms. Rather, emphasis should be placed on the transformation of both general and research data into comprehensible and useable teaching materials for purposes of biology instruction in the schools.

Review of the Current Status with reference to the Organisation of Local Flora and Fauna for Biology Teaching.

Each participant present at the workshop outlined briefly an overview of the present status of interest and activities in the preparation of local biological materials/examples for purposes of school instruction. The purpose of this exercise was to establish at the outset the necessary baseline information from which the Workshop may then launch its deliberations. Basically, it was an attempt to acquire a broader perspective of this specific problem in different member countries within the Region.

The views expressed can be generalised as follows:-

1. It was agreed that in the respective member countries there was a wealth of available information, experiences and expertise about the local flora and fauna.

2. Such knowledge, however, are widely dispersed with different individuals in their own areas of specialisation and interest or merely confined within the pages of research and general publications, with little or no effort to disseminate usch information to teachers in the secondary schools.

3. With the exception of the Philippines (through the auspices of the National Science Education Centre) and Indonesia (through the initial programme of the National Biological Institute), much of the wealth of useful information are not yet formalised and compiled for purposes of biology instruction in the schools.

4. In those countries which have either adapted or are in the process of adapting the BSCS text, it is acknowledged that some attempts have already been initiated in the use of local flora and fauna whenever and wherever it is deemed appropriate.

5. In member countries whose medium of instruction is not in the English Language, it is noted that the project creates a new dimension of demand on the local personnel for much of the information has yet to be translated accurately into the National Language of the country. At presant, in thses countries, much of the invaluable information are still recorded either in Dutch, French or English.

6. All participants expressed confidence that there is no sufficient specialist personnel in the respective countries who can be called upon to assist RECSAM in this Project as the primary source of contributors of informations and expertise.

Identification and Selection of Crucial Areas in the Biology Curriculum (having a need for the use of Local Flora and Fauna)

After much discussion, it was generally agreed that the area of biology information should be sufficiently broad and crucial in the teaching of biology in the different countries in this Region. The following areas of priority were agreed upon:-

1. Ecological Studies
2. Physiological Studies
3. Studies in Cellular Biology (including aspects of cytogenetics)
4. Taxonomic Studies (with emphasis on the complementarity of morphologival types and their respective functions or adaptive features).

It is necessary to clarify that these areas of biology are no less important than any other areas which have not been mentioned here. It was merely deemed prudent to begin on a more conservative and realistic programme which is not to divers so that hopefully, it would be possible in the future to emasure its relative merits and limitation.

The selection was determined by the following criteria:-

1. That the areas of knowledge should be sufficiently common to all countries of SEAMEC,
2. That there is an urgent need for more information in these areas about the local flora and fauna,
3. The specific details do contribute to broader unities of biological knowledge having wider application in the schools.
4. The feasibility of the sub-projects should be consonant with the overall expressed goals of the RECSAM project for Biology.

These priority areas thus specified are then further clarified with specific reference to the kinds of information which are required by the schools who are expected to refer to such resource materials. In the attached appendices, the different catagories of information required are set out in the respective formats.

In the sections following, a brief outline of the main ideas about each of the areas of priority are clarified for purposes of guidance, as follows:-

(A) Ecological Studies - namely in three areas:-

1. Studies of Marine or Estuarine Mangrove

The study was identified as an area, worhty of attention because (a) Mangrove vegetation and community is common to all the member countries in this Region, (b) it is a closed community and thus deemed more manageable in terms of the relatively lower number species (flora and fauna) and (c) perhaps, more readily available to and accessible to schools as a whole. The biology of the mangrove could readily be extended into an inquiry about its economic importance as well.

2. Secondary (Belukar) Forest and/or the Lawn

This reas of study was highlighted because it was thought necessary an ecological study with a habitat(s) which is nearest to or most commonly accessible to most schools. In the long term view, it is anticipated that any measure of experience and success in such 'familiar' habitats could possibly encourage the school teachers of biology to explore further into the more complex system of the humid tropical Primary Forest ecosystem.

3. Economic Studies

As an initial attempt, only two studies are singled out for further clarification with respect to certain aspects of both terrestrial and aquatic productivity.

(a) The Economic Study of the Timber Forestry and Industry

The purpose of this study is to initiate an inquiry which involves only a few selected species of Primary Forest trees of sufficient economic importance to each member country. An understanding of the biology of forestry techniques could clarify the applied knowledge of sound ecological principles in terms of forest management and civi-cultural practices, conservation and measures of plant protection. As an industry of National importance, the timber species could be studied on a comparative basis from within this Region.

(b) An Economic Study of the Fisheries Industry

For the same purpose as in 3(a) above, a compilation of the knowledge about the local examples in both the Freshwater and Marine Fisheries Industries, could help schools to understand well not only a few common species, but also further emphasise the application of sound ecological principles in the maintenance of optimum food production (a protein source). Such studies could be further related to an understanding about food production to meet the ever increasing needs of population growth, and higher standards of nutritional requirements.

(B) Physiological Processes

While this area was most common to the teaching of biology in the different member countries, however, it was emphasised that often the problem arose whenever suitable local flora and fauna had to be used in laboratory demonstrations or investigations. In this respect, five areas of physiological "unities" are identified for further clarification.

1. Regulatory Processes

(a) Hormonal Control:

Both the functions of endoctrines in different animals (common examples) and effects of auxins (and other growth promoting substances) in plants (common examples).

It was decided to include this area of knowledge because most practicing biology teachers are not fully conversant with the use of local examples for purposes of either demonstrating the phenomenon or investigating some aspects of the process.

(b) Water Balance: These broadly includes the processes of absorption, diffusion, osmosis, osmo-regulation, transpiration and guttation, membrance properties and excretion.

Specific to this instructional 'unit' is not only the need to know what local flora and fauna are best suited for laboratory purposes, but also, the specific techniques which other teachers and investigators have found to be workable and useful for school instruction purposes.

2. Behavioral Responses

Conventionally better known in School biology as the irritability or sensitivity or responses of the living organism to the various stimuli in the environment. Attempts will be made to collate information of the "exotic" behaviour of certain local plants and animals which exhibit phenomena such as photoperiodism, "seasonal change" (flowering- fruiting, defoliation) and the range of nastic and tactice responses.

3. Life Cycles

To a certain extent, information required for this area is subsumed under the section of "hormonal Control" (e.g. the regulatory mechanism of growth and development). Specifically, this area refers to knowledge about the reproductive mechanisms and adaptive features of the local flora and fauna which are common and well known in each member country. While there may be unrealted pieces of information about a diversity of local examples, however, these may contribute sufficiently to an understanding of the entire life history of the organisms as a whole.

It is hoped that whatever information there is available may be collected about the local flora and fauna, so that these can be used fruitfully to increase the awareness of students in the schools about their own environment.

4. Photosynthesis

While this process is peculiar only to green plants., it has been included bacause there is a need to know about the most common and appropriate types of plants or plant materials which can be used for (a) demonstrating the phenomenon, (b) laboratory investigations (both qualitivative and quatitative) and (c) the extraction of pigments (apart from the classical use of spinach).

It is hoped that academic institutions of higher learning (Colleges and Universities) may be able to share and disseminate their knowledge and experiences in this respect for the benefit of school biology instruction.

5. Germination

It is acknowledged that local examples cited for other areas (e.g. Life Cycles) may also be used profitably in this section, it needs further emphasis that more specific information should be obtained about (a) the conditions of germination of different types of local seeds or pollen grains, (b) seed viability and storage specifications, (c) duration of flower - seed and see to flower, and (d) the characterisation of the seeds into types such as endospermic and non-endospermic, epigeal and hypogeal mode of germination.

(C) Cellular Biology

Emphasis is placed on the use of well known local examples of plants and animals for purposes of teaching the following aspects of cell biology:-

1. Gross morphological details

It is very desirable at this stage to know what types of local examples are best suited for purposes of teaching and also about the various cytological and histochemical techniques which are most appropriate for the inquiry into the cytological details of the cell both cytoplasmic (e.g. cyclosis, mitochondria, choloroplasts, etc.) and nuclear (e.g. karyological studies chronosome structure and behaviour). At this levwl, appropriate local examples are needed to demonstrate the different types of cell wall structure and composition.

2. Cell types

Emphasis here is directed at cell specialisation and differentiation. Local, well known examples are needed to demonstrate such types amongst animals and plants which may be used fruitfully for school instructional purposes. It may be necessary to compile sufficient information about these types which schools may incorporate directly into the teaching of this area of knowledge.

3. Sub-Cellular studies

This is probably one of the most recent areas of inclusion in the biology curriculum. As such, there is an urgent need to acquire information and photographic illustrations of the local plants and animals examples which have been investigated (by the different countries) at the sub-cellular level. Attempts will be made to secure electron photomicrographs based on studies made on local examples.

(D) Taxonomic Studies and Type Examples

In this area of priority, it should be timely for RECSAM to begin compiling information on the variety of plant and animal examples which are most appropriate for the teaching of the different animal and plant types (mostly descriptive). Emphasis should be given to the organisation of such information so as to highlight the nature of comparative morphology and also to relate the complementarity of structural features and functions.

Guideline for Implementation of the Project

(1) The Central Processing Centre

The project is generated at the "Central Processing Centre." Its function is centralise and coordinate the administrative functions in terms of Planning and Organisation of the proposed project.

(A) Planning

It is envisaged that there would be various stages and levels of planning so as to see the Project through. Initially, the planning involves the decisions made on the crucial areas worthy of pursuing in the Project. These areas need to be identified in terms of the relative priorities so that the project which is undertaken (ultimately is both feasible and useful (in terms of the school needs).

The details of the project (e.g. compilation of resource materials in terms of local flora and fauna) are then specified so that specific areas of useable information may be sought from 'outside' specialists, in the member countries.

At the planning stage, guidelines for immediate and long term implementation of the Project is then proposed. (This includes an identification of a list of Organisations, Institutions and Specialists, to whom RECSAM may approach for the acquisition of the desired information.

(2) Input (Producer)

Via pathway (1), RECSAM organization corresponds with the specialists concerned to procure the desired information. This constitutes the "peripheral participation and contribution" of specialists in different member countries towards the Project.

Information from the various countries are then returned via (2) to RECSAM. Through its organisation, the Centre then (a) sieves the multiplicity of information, (b) compiles and edits the selected materials, and (c) organise them into coherent and structured information which teachers may use directly in the schools. It is emphasised that during this stage, RECSAM should organize workshops of a different nature from the present one, charged solely with the responsibility preparing the "local flora and fauna" for school use. Furthermore, in view of the different areas of "specialisations" proposed, each member country should have more than one specialist represented at the workshop.

In the final stage of RECSAM organisation it acts as a clearing house whereby the processed materials re then sent out for trial use in a selected sample of schools in the respective countries.

(III) Output (Consumer)

Educational institutions, selected by RECSAM to participate in this Project receive the resource materials (information about local flora and fauna in the different biology areas) via pathway (3).

It is expected that at this stage, the schools and Colleges/ Universities who choose to use the materials are now called upon to evaluate the usefulness of the materials which have been suggested, and to suggest modifications to these interms of the teaching problems thus encountered.

For this purpose, it is envisaged that a comprehensive questionnaire should be devised so as to get the kind of feedback information which RECSAM would require for subsequent improvement.

The feedback may be directly from RECSAM (42) or possibly from the schools to the Authors (4b) who have contributed information.

At any stage, problems arising from the implementation of the Project may then further refined according to the established guideline.

A Final Remark

Members at the Workshop wish to draw the attention of RECSAM to the following provision if the Project is implemented.

1. Information and materials contributed to the Centre and used by the Centre must be acknowledge accurately and in full.
2. RECSAM should give the assurance that such information contributed by authors in different countries will not be used by any other organisation or individual, unless the consent of the authors have been obtained in writing.

Post-script: This is a very rough first draft of the proceedings of the workshop. There are many mistakes and issues which need further refinement.

Yeoh Oon Chye
(Chairman)

Participants

1. Mr. Yeoh Oon Chye – Faculty of Education,
   University of Malaya,
   Kuala Lumpur.
2. Mrs. Gandjar – National Biological
   Institute,
   Treub Laboratory,
   Kebun Raya, Bogor,
   Indonesia.
3. Mrs. Lorenza D. Mamaril – Supervisor,
   Bureau of Vocational
   Education,
   Ministry of Education,
   Arroceros Street,
   Manila, Philippines.
4. Mrs. Tran Kim Hanh – University of Saigon,
   Faculty of Pedagogy,
   Saigon,
   Vietnam.
5. Mrs. L.K. Sigamoney – Assistant Inspector of
   Schools,
   Ministry of Education,
   Kay Siang Road,
   Singapore 10.
6. Miss Tiny Anakasant – Supervisor in Biology,
   Supervisory Unit,
   Dept. of Secondary Education,
   Ministry of Education,
   Rajadamnernook Avenue,
   Bangkok, Thailand.
7. Enche Ariffin Suhaimi – Sekolah Alam Shah,
   Jalan Cheras,
   Kuala Lumpur.
8. Mr. Saran Singh Sekon – Educational Planning &
   Research Division,
   Ministry of Education,
   Federal House,
   Kuala Lumpur.

INPUT
(Procedure)

Peripheral Participation & Contribution from Specialists in Member Countries

Contributions on:

(a) Flora & Fauna (local indigenous & exotic)

(b) Information about (a) above useful for teaching in the schools for research.

(c) Useful references in terms of texts (general and specific). Research Journals and other publications common to each member country.

Central Processing

RECSAM: Central Planning & Organisation

A. Planning

- decision on crucial areas
- identification of priorities in Biology curriculum.
- specification for acquisition of resource materials (formulation of criteria and catagories of information)
- Guidelines for implementation (immediate and long term)

B. Organisation (RECSAM)

- correspondence
- compilation
- editorial
- eclearing house
- cycle of stages in the implementation of the project.

OUTPUT
(Consumer)

Educational Institutions

Evaluation of Resource Materials

(a) usefulness (availability applicability, etc.)

(b) suggestions on modification and adaptations (feasibility

(c) teaching problems and limitations encountered.

ANNEXURE 7

Report on the Integrated Science Course Year II
4th - 22nd August, 1969.
Malayan Teachers College, Penang, Malaysia.

INTRODUCTION:

The Integrated Science Year II Course for junior high school was conducted by the Ministry of Education, Malaysia for 40 local science teachers as a continuing programme in its second year for 20 trial schools next year, with the assistance of a team of six tutors from Scotland led by Mr. A.W. Jeffrey. Other local participants included three Federal Inspectors, eleven State Science Supervisors and seven science education lecturers besides six participants from SEAMEO countries.

ITS PHILOSOPHY & OBJECTIVES:

The course makes use of the "discovery" or investigatory approach linking all branches of science with the environment of pupil. This course is so designed that all pupils begin to appreciate the workings and the methods by which science knowledge has been acquired and they are trained to be curious of happenings around them. If a pupil leaves at the end of the Lower Secondary School, he will at least have an understanding of the basic principles of science so that he has sufficient knowledge to fit into the modern society of his time. A pupil who is not so scientifically inclined, but whose interests are in the humanities, will possess knowledge and skills to appreciate the working of science. For the future specialists in science there is sufficient scientific material within the course to be a challenge to the best of them.

REPORT OF THE COURSE:

A programme of the three-week course is attached in Annexure 1.

The Second Year portion of the Integrated Science Course for Malaysian trial schools cover the following sections:

					Subject Matter
1.	Section	5	-	Solvents & Solutions	-Chem. & Bio.
2.	"	8	-	Some Common Gases	-Chem. & Bio.
3.	"	9	-	Making Heat Flow	-Physics & Chem.
4.	"	10	-	Hydrogen, Acids, Alkalis	-Chemistry
5.	"	11	-	Detecting the Environment	-Bio. & Physics
6.	"	13	-	Support and Movement	-Bio. & Physics

One of the features of the teachers' course was the fact that two-thirds of their time was spent on carrying out the practical and experimental work which forms the basis of suitable learning situations for the pupil in order to help him develop a healthy attitude to science, creative thinking, and the spirit of science and enquiry through the investigatory approach.

Sufficient time was devoted to discussion of the various aspects of each section such as the teaching methods to be used, the necessary introduction prior to the pupil's practical work, the amount of factual information for the pupil, the organisation of the practical work and the necessary follow-up by the class at the end of a practical session.

Tutors conducting the course frequently emphasised to teachers that what they were doing was the way Integrated Science was to be taught to Scottish pupils and where materials and practical work involved were found unsuitable for any country. These should be amended or substituted by appropriate materials. Any curriculum reform should be planned to meet the needs of each individual country.

Sessions on objective testing and "shredding" formed an important part of the course and participants found them very stimulating.

The most important feature of the Scottish Integrated Science Course is the unity of science reflected in selected topics that have natural integration of physics and chemistry, or chemistry and biology or all the three disciplines.

Brief reports on how Integrated Science course can be adapted for use in the different member countries. These reports are given below.

INDONESIA

The Integrated Science Course can be fitted into the science education programme but it will take time to make the necessary arrangements. Most Indonesian schools teach General Science but lack suitable laboratory facilities. Often laboratories are shared by schools in a given area. Although the 5 year educational plan for Indonesia as fits in its curriculum content, some change in the methods of teaching can be done. There are groups of teachers carrying out work on education to renew science curriculum Indonesia would like to have a Integrated Science Group to run courses in their country.

PHILIPPINES

The status of Secondary Science Education in the Philippines is such that the process of inquiry and guided discovery approach has already been implemented since 1964. With particular reference to General Science I and II, equivalent to Forms 1, 2 and 3 of the Integrated Science Course, the revision of the Teachers Guides were written in May 1965. These guides however are still experimental in nature.

A close look at the Integrated Science syllabus and its accompanying worksheets reveal a well-organised body of scientific knowledge for teaching General Science to youngsters ages 12 to 14 in the Philippines Secondary schools. The laboratory skills and techniques used are quite an experience for them. There is a continuous correlation and integration of both biological and physical science. It is in these respects that we find the Integrated Science Course useful and worthwhile considering. Tentative plans are now being formulated for the final revision of our General Science Guides with the Integrated Science Course in mind. Its direct implementation however was the inclusion of some selected topics and laboratory techniques for the in-serivce training course of some 125 General Science key teachers held in five regional centres throughout the country beginning August 11 - 15, 1969.

At this stage it is rather premature to give a comprehensive report on how well the Philippines can gain benefits from this training course. As soon as the whole training programme is over when the undersigned shall be able to have an overall view of the Integrated Science programme she will be happy to report to SEAMEC office how effectively she can adapt and use her training to fit her country's local needs.

THAILAND

Thailand school educational system has 7 years of primary, 3 years for lower secondary and 2 years for upper secondary. The Integrated Science Courses can be adapted for the lower secondary classes in Thailand schools.

In the introduction of new science programmes there are several problems. The most important is the lack of trained teachers and sufficient laboratory facilities for schools especially in rural areas. The material has then to be adapted and translated into Thai for use by teacher in-service course. These have to be planned. It would also be necessary for laboratory assistants to be trained to make the various apparatus needed for the Integrated Science Course.

Teacher Vacation Course in Integrated Science
Malayan Teachers' College - Penang
4th August - 22nd August 1969

Director: - Mr. A.W. Jeffrey H.M.I.

Tutors: - Mr. J.W. Burdin H.M.I.
Mr. J.G.M. Halliday
Mr. J.A.R. Hughes
Mr. T.I. Morrison
Miss M.A.A. Simpson

Programme

<table>
<tr><th>Date</th><th>8.30 - 9.15 am</th><th>9.20 - 10.30 am</th><th>11.00 - 12.30 pm</th><th>2.00 - 4.30 pm</th></tr>
<tr><td>Monday 4th August</td><td>Official Opening</td><td>General Review A.W.J.</td><td>Introduction to Section 9 J.G.M.H.</td><td>Section 9 Practical (1) J.G.M.H/J.A.R.H.</td></tr>
<tr><td>Tuesday 5th August</td><td>Objective Testing (1) J.G.M.H.</td><td>Introduction to Section 5 T.I.M./M.A.A.S.</td><td>Section 5 Practical (1) T.I.M./M.A.A.S.</td><td>Section 5 Practical (2) T.I.M/M.A.A.S.</td></tr>
<tr><td>Wednesday 6th August</td><td>Objective Testing (2) J.A.R.H.</td><td colspan="2">Section 5 Practical (3) T.I.M./M.A.A.S.</td><td>Workshop J.G.M.H./J.A.R.H.
Objective Testing Shredding J.W.B./M.A.A.S/ T.I.M.</td></tr>
<tr><td>Thursday 7th August</td><td colspan="2">Section 5 Practical (4) T.I.M./M.A.A.S.</td><td>Units J.A.R.H.</td><td>Objective Testing Shredding J.W.B./M.A.A.S./ T.I.M.
Workshop J.G.M.H./J.A.R H.</td></tr>
<tr><td>Friday 8th August</td><td>Section 5 Emulsions & Colloids T.I.M.</td><td>Films Chick Embryo Work in Biology J.W.B.</td><td>Section 5 Practical (5) T.I.M./M.A.A.S</td><td>Section 5 summing up T.I.M./M.A.A.S.</td></tr>
<tr><td>Monday 11th</td><td>Introduction to Section 11 J.G.M.H./J.W.B.</td><td colspan="2">Section 11 Practical (1) J.G.M.H./J.W.B.</td><td>Section 11 Practical (2) J.G.M.H./J.W.B.</td></tr>
</table>

Date	8.30 - 9.15 am	9.20 - 10.30 am	11.00 - 12.30 pm	2.00 - 4.30 pm
Tuesday 12th August	Section 11 Practical (3) J.G.M.H./J.W.B.		Films M.A.A.S./J.A.R.H/ T.I.M.	Section 11 Practical (4) J.G.M.H./J.W.B.
Wednesday 13th August	Section 11 Practical (5) J.G.M.H./J.W.B.		Section 11 Practical (6) M.A.A.S.	Section 11 Practical (6) cont and summary J.G.M.H/M.A.A.S./J.W.B.
Thursday 14th August	Introduction to Section 8 T.I.M./M.A.A.S.	Section 8 Practical (1) T.I.M./M.A.A.S.		Workshop J.G.M.H/J.A.R.H Shredding J.W.B./T.I.M./M.A.A.S.
Friday 15th August	Section 8 Practical (3) T.I.M./M.A.A.S.		Section 8 Practical (4) T.I.M./M.A.A.S.	Section 8 Practical (2) T.I.M./M.A.A.S.
Monday 18th August	Section 8 Practical (5) T.I.M./M.A.A.S.		Section 8 Practical (6) T.I.M./M.A.A.S.	Shredding J.W.B./T.I.M./M.A.A.S. Workshop J.G.M.H./J.A.R.H.
Tuesday 19th August	Section 8 Practical (7)		Section 8 Summary T.I.M./M.A.A.S.	Introduction to Section 13 J.A.R.H./M.A.A.S.
Wednesday 20th August	Section 13 Practical (1) J.A.R.H/M.A.A.S.		Section 13 Practical (2) J.A.R.H/M.A.A.S.	Section 13 Practical (3) J.A.R.H/M.A.A.S.
Thursday 21st August	Section 13 Practical (4) J.A.R.H/M.A.A.S.		Section 13 Practical (5) and summing up J.A.R.H/M.A.A.S.	Introduction to Section 10 and Practical (1) A.W.J.
Friday 22nd August	Section 10 Practical (2) A.W.J.		Section 10 Practical (3) and summing up A.W.J.	Objective Testing and Close A.W.J./J.A.R.H.

SEAMEO Participants

1. Mr. F. Pangemanan	- Staff Members, Senior Teaching Centre, Bandong, Indonesia.
2. Mr. SioneSone	- c/o Khampent Katavong, Ministry of Education, Vientiane, Laos.
3. Mrs. Rosalina R. Kintanar	- Curriculum Co-ordinator, Bureau of Public Schools, Manila, Philippines.
4. Mr. Payont Saengdet	- Head of Education Section, College of Education, Bangkok, Thailand.
5. Mr. Cheah Chye Keat	- c/o Teachers' Training College, Singapore.
6. Mrs. Ho Ang Thi Doan	- c/o Mrs. Bukhai Lam, Ministry of Education, Saigon, Vietnam.

ANNEXURE I

PROGRESS REPORT OF THE BROCHURE

The text of the draft brochure has been reviewed and brought up to date at a meeting held in Kuala Lumpur on 11th July 1969. Mr. Chin Pin Seng, Acting Chairman, Steering Committee; Mr. T.B. Slattery, Planning Consultant to RECSAM and Mr. C. anasalingam the Programme Co-ordinator discussed with Cathay Advertisers and finalised the text materials and arrangement for Cathay to prepare the preliminary "mock-up".

A second meeting was held in early August when Mr. Chin discussed the design of the cover with the Cathay Advertisers. The "mock-up/dummy" of the brochure was taken to Bangkok by Mr. Ron Rogers of the U.S. Embassy, Kuala Lumpur for discussions with US/AID officials on the various points regarding the text.

At another meeting held in the Ministry of Education on the brochure on 28th August, it was suggested that the text of the material be reduced considerably so that the Fund Raising committee that the Ministry was planning to appoint could use this. Some suggestions for alterations were handed to Cathay Advertisers on September 5th and it was finally agreed that two versions of the brochure

i) with the original text

(ii) with reduced text materials (refer attached annexure)

would be prepared for final approval by the Ministry of Education and US/AID.

RECSAM
Brochure with reduced text materials

19th September, 1969.

FRONT COVER

	(Illus.)
	(RECSAM logo)
Base:	REGIONAL CENTRE FOR EDUCATION IN SCIENCE AND MATHEMATICS

INSIDE FRONT COVER

Illus.	(View of Penang harbour taking in section of coast line)
Copy:	Penang Island ... home of the Regional Centre for Science and Mathematics.

P.1

Copy:	(Einstein's message)

P.2

Illus.	(SEAMEO Organisational chart)

P.3

Heading:	WHAT IT IS ALL ABOUT
Caps.	SEAMEO

Copy: The Southeast Asian Ministers of Education Organisation was established by the governments of 7 Southeast Asian countries to promote regional cooperation in education.

They are: Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand and the Republic of Vietnam.

Caps. SEAMEC

Copy: The Southeast Asian Ministers of Education Council is the policy-making body of the Organisation. Its members are the Ministers of Education of the member countries of the Organisation.

Caps. SEAMES

Copy: The Southeast Asian Ministers of Education Secretariat, located in Bangkok, is the executive arm of the Organisation. Its function is to implement the policies approved by the council.

Its staff are nationals of the member countries of the Organisation but they are responsible to the Organisation and not to the individual member countries.

Caps. RECSAM

Copy: The Regionals Centre for Education in Science and Mathematics is one of six projects of the Organisation established in the various member countries.

Its primary function is to improve the teaching of Science and Mathematics at elementary and secondary school levels to meet the scientific and technical manpower needs of Southeast Asia in the future.

P.4

Illus. (Artist's impression RECSAM buildings and campus)

P.5

Heading: THIS IS RECSAM

Caps. THE PROPOSED CAMPUS

Copy: An Artist's impression of the buildings and campus site of the Regional Centre for Science and Mathematics, now being constructed.

Located on high ground overlooking the Indian Ocean, the Centre will have laboratories, libraries, lecture theatres, an administration block and hostels for staff and student accommodation.

The hostel design is unique in that it provides for co-mingling among students from different member countries. Consisting of sub-blocks of five or six rooms clustered around a common study area, it ensures that the students not only live together but also study and work together.

The Centre is currently housed on the Malayan Teachers' College campus, adjoining the new RECSAM Site which will be fully operational in 1972.

P. 6

Illus. (College of students at work and at play)

P. 7

Heading: THIS IS RECSAM

Caps. THE PRESENT PROGRAMME

Copy: In mid 1970 RECSAM becomes semi-operational with the completion of the first phase of the building plan. During this nurturing period, training courses will be conducted. At present, key teacher trainers from member countries throughout Southeast Asia are undergoing courses in Architectureal and Engineering studies. These courses will continue and widen in scope until 1972 when

Caps. LOOKING AHEAD

Copy: RECSAM will have 100 full-time staff

a student body of
undergoing training courses
totalling student-months a year.

P. 8

Illus. (RECSAM structural chart)

P. 9

Heading: THIS IS RECSAM

Caps. THE STRUCTURE

Copy: The Regional Centre is an autonomous institution established by SEAMEC with the cooperation and suppo of the Government of Malaysia.

It is administered by a Director under the guiding policy of SEAMEC which channels its policy decision through a Steering Committee.

This Committee is made up of two delegates from each of the member countries.

An International Advisory Council consisting of educators and scholars of international repute has been formed to guide the Director in developing the Centre's programmes.

P.110

Illus. (National flags of, in order: Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam with captions identifying flags)

Base: Member countries of SEAMEO

P.-11

Heading: THIS IS RECSAM

Caps. THE FUNCTIONS

Copy: To achieve RECSAM's aim of improving the teaching of Science and Mathematics at primary and secondary school levels, two basical approaches have been outlined.
*Review of subject matter to reflect and meet the vital needs of Southeast Asia.

*Improvement in the techniques of transmitting this subject matter to the student.

Thus, the major functions of RECSAM are: 1. To trai key teacher-educators from member countries who are concerned with Science and Mathematics education.
2. To develop syllabi, teaching techniques, materials and aids based on applied research. 3. To develop evaluation techniques to measure the effectiveness of the teaching programme. 4. To channel relevant scientific information to potential users in member countries.
5. To assist member countries in using, most effectively, outputs of RECSAM.

P. 12

Illus. (RECSAM funding diagram)

INSIDE REAR COVER

Heading: RECSAM NEEDS YOUR HELP!

Copy:

A five year operational plan has been established for RECSAM. The total cost of this plan is US$8.7 million. The United States Government will underwrite 50% of this cost.

RECSAM still requires US$3.5 million in order to meet its programme commitments. Its most urgent needs are the Special Funds requirements. In addition, the Centre seeks help, on behalf of the Malaysian Government, in under-writing its Special Equipment and Operating cost

Consequently, the Centre looks to governments, foundation universities, commercial organisations and interested people for assistance in cash and in kind.

Those interested in contributing to this poineering effort in regional cooperation are invited to write to:

The Director,
RECSAM,
c/o Malayan Teachers' College,
Penang, MALAYSIA.

REAR COVER

Illus. (as on front cover)

MEMORANDUM OF UNDERSTANDING CONCERNING THE ESTABLISHMENT OF THE REGIONAL CENTRE FOR EDUCATION IN SCIENCE AND MATHEMATICS

In order that the parties to this Memorandum of Understanding may achieve more rapid progress toward the realization of a Regional Centre for Education in Science and Mathematics, located at Penang, Malaysia, they have decided to set forth below the obligations and responsibilities that they are prepared to accept with respect to the implementation of the project for the Regional Centre.

1. The Southeast Asia Ministers of Education Secretariat (SEAMES), the Government of Malaysia (GOM) and the United States Government (USG) jointly agree as follows:

   (a) To take steps immediately to complete project planning and prepare a draft project agreement for the financing of the construction and operation of the Centre;

   (b) It is understood that the implementation of all undertakings with respect to the Centre are contingent upon approvals and appropriations of the necessary funds by the respective governments;

   (c) To accept the principle that sharing of total project costs mutually agreeable to SEAMES, GOM and USG shall be on a 50 - 50 matching basis between the USG and GOM and that if the actual costs vary from the estimated costs to change the 50 - 50 ratio, this will be the subject of joint discussion between the parties concerned and adjustment of project plans or other accommodations, if necessary, will be made to preserve the 50 - 50 relationship. It is understood that the GOM can seek contributions from third parties to meet its share of project costs.

2. The Government of Malaysia undertakes to:

   (a) Provide a suitable site for the Centre;

   (b) Assume responsibility for full operating costs of the Centre for a five year period beginning July 1970 (except for costs to be borne by the SEAMES centrally) plus limited capital costs as mutually agreed. Near the end of the five year period, the future programme and funding of the Centre will be subject to terms of a new agreement between the Southeast Asia Ministers of Education Council (SEAMEC) and the GOM. Such an agreement shall take into account the principle that the GOM accepts primary responsibility for the future funding of the Centre;

(c) Finance from its own resources all costs of International House-type facilities of the Centre not directly associated with the mutually agreed programme needs of the Centre, provided however, that the GOM may attribute for matching purposes contributions to finance International House-type facilities that are for mutually agreed programme needs;

(d) Assure that the construction contractor utilizes equipment and supplies of U. S. origin to the extent items of local manufacture are not available and unless non-U.S. source procurement is agreed to with the USG. It is agreed that project facilities financed hereunder shall in any event, subsequently be devoted to educational purposes;

(e) Utilize the services of a U. S. consultant(s) in connection with the work of the architect and not to proceed with construction until mutually acceptable building plans and construction arrangements have been adopted;

(f) Make arrangements for necessary audits of project accounts by any of the parties hereto;

(g) Take account of applicable statutes and policy restrictions of both government relating to contracting and procurements as may be found necessary in the course of future negotiations leading to a firm project agreement;

(h) The GOM agrees to allocate all income from the operation of the International House facilities to defray costs of operating the Centre and to reserve any excess of income over operational costs for funding SEAMEC projects in Malaysia.

3. The USG undertakes to:

(a) Finance the capital, commodity and equipment costs of the Centre in accordance with detailed building plans and design and construction arrangements which shall be mutually agreed upon and specified in the Project Agreement;

(b) Provide interim support to the Centre along with the GOM and other participants in the project as may from time to time be agreed to pending initiation of project operations in the new facilities;

(c) Provide a minimum of two U. S. professional staff for up to five years, as needed, to work under the direction of the Project Director;

(d) Finance up to 50% of mutually agreed Special Funds activities administered through SEAMES.

4. SEAMES undertakes, in keeping with relevant SEAMEC Funding Resolutions, to seek to provide the 50% of the Centre's requirements for Special Funds as may be agreed upon by the GOM, the USG and SEAMES.

For the Ministry of Education of the Government of Malaysia	For the Government of the United States
NAME: Sgd: xxxx	NAME: Sgd: xxxx
TITLE: MINISTER OF EDUCATION MALAYSIA	TITLE: American Ambassador
DATE: 12.6.69	DATE: June 12, 1969

For SEAMES
(on behalf of SEAMEC)

NAME: Sgd: xxxx

TITLE:

DATE:

ANNEXURE IO

SIXTH MEETING OF THE STEERING COMMITTEE
SINGAPORE - OCTOBER 21 - 24, 1969.

Progress Report on the Architecutral & Engineering Studies of the 1st Phase of the Centre Buildings

The working drawings for the 1st Phase Buildings of RECSAM have been completed by the Public Works Department, Penang. These have been forwarded to the Ministry of Education, Malaysia, Kuala Lumpur, through the Director of Public Works, Malaysia for discussion and approval by the Economic Planning Unit of the Prime Minister's Department of the Malaysian Government. This is a necessary step as the Malaysian Government has agreed to underwrite the operating and maintenance costs of the Centre for 5 years, beginning July 1970.

Mr. Paul Beidler, Consultant Architect, US/AID Bangkok, has already examined the preliminary working drawings and forwarded copies of these to the US/AID in Washington for their comments and approval. It is hoped to have the various formalities sorted in respect of the working drawings by the middle of October, 1969.

A Senior Architectural Assistant was engaged by RECSAM from the 19th of May, 1969 to assist in the preparation of the architectural drawings of the Centre. Arrangements are being made for the purchase of surveying instruments for use by the Resident Engineer and technicians for preparation of the site and supervision of the building operations which are expected to begin some time during this year or early January 1970.

Before construction work can be started there are several formalities to be completed.

(i) A Supplementary Letter of Agreement to the Memorandum of Understanding (Annexure I) has to be signed as soon as possible. Preliminary discussions on the first draft were held between officials of US/AID, Ministry of Education, Malaysia and RECSAM on the 27th of August, 1969 at Kuala Lumpur. The second draft of this Supplementary Letter of Agreement was discussed between US/AID officials and RECSAM officials on 8th September, 1969 at Bangkok. The Project Office is given to understand that this draft has been sent to Washington for their scrutiny and amendments to be made after which the Malaysian Government has to agree on the final version before the Supplementary Letter of Agreement can be signed. It is hoped that the signing ceremony can be held before the Sixth Meeting of the Steering Committee.

(ii) One of the terms in the Supplementary Letter of Agreement (Clause XII) "The Government of the United States will meet its Malaysian dollar costs by utilising a Special Letter of Credit." Preliminary discussions on this implementation memorandum and agreement on the generation of Malaysian dollars, by using Special Letter of Credit (Annexure II) were held at the Bank Negara (National Bank of Malaysia) in Kuala Lumpur on the 23rd of September, 1969 between officials of US/AID, Ministry of Education and RECSAM. This matter would be presented to the Governing Board of Bank Negara for their consideration.

(iii) A pre-bid exercise for the registration of contractors/bidders has to be carried out as soon as the Supplementary Letter of Agreement has been signed. This exercise is expected to be completed in 3 weeks, i.e. before the end of November, 1969, when an approved list of bidders/contractors would be registered with the Project Office by the end of November, 1969.

(iv) Working drawings with specifications would then be distributed to the registered bidders for sending in their bids. This exercise is expected to take about 40 days.

Construction work is expected to start on the 1st Phase buildings in January 1970.

ANNEXURE II

REPORT OF VISITS OF CHAIRMAN, MR. J.E.B. AMBROSE, MALAYSIAN DELEGATE, MR. CHIN PIN SENG OF THE STEERING COMMITTEE AND THE PROGRAMME CO-ORDINATOR, MR. C. GANASALINGAM OF RECSAM TO KOREA AND THE REPUBLIC OF CHINA FROM 9TH APRIL TO 11TH APRIL, 1969.

Visit to Korea:

Seoul, Korea: 9th April 1969.

Venue:. College of Education, Seoul National University, Korea.

Present:	Dr. Kim Sung Keun	Dean of the College of Education
	Dr. Chung Yun Tai	Chairman, Science Education Study Committee
	Dr. Kim Joo Min	" Biology Education Study Committee
	Prof. Choi Ki Chul	Dept. of Biology, College of Education
	Prof. Lee Won Shik	" " Chemistry, " " "
	Prof. Lee Tai Ryung	" " " " " "
	Prof. Lee Soo Ho	" " Physics, " " "
	Prof. Park Yong An	" " Earth Science, " " "
	Prof. Shin Hee Myung	" " Physics, " " "
	Prof. Chung Chang Hee	" " Earth Science, " " "
	Prof. Park Seung Jae	" " Physics, " " "
	Prof. Lee Wong Jik	" " Biology, " " "
	Dr. Kim Dai Sik	" " Physics, " " "
	Dr. Kim Jin	" " Biology, " " "
	Dr. Fowler	Fulbright Professor, Biology
	Mr. Lee See Beng	Administrator, Ministry of Education, Korea.
	Mr. J.E.B. Ambrose	Chairman, Steering Committee, RECSAM.
	Mr. Chin Pin Seng	Malaysian Delegate, Steering Committee, RECSAM.
	Mr. C. Ganasalingam,	Programme Co-ordinator, RECSAM.

Discussions were held with the staff members of the Science and Mathematics Faculty of the College of Education, Seoul National University, Korea.

Dr. Shin outlined the education system of his country based on the 6-3-3-4 pattern and indicated the number of hours for science for each of the levels:-

Primary (elementary):	two 40 min. periods per week
Junior High	three/four 45 min. periods per week
Senior High Science Group:	four periods per week in Grade 10 for Biology
	five periods " " in Grade 11 for Chemistry
	six periods " " in Grade 12 for Physics
Non-Science Group:	fewer periods and physics is optional.

In the primary (elementary) stage the Ministry of Education standardises the curriculum and supplies textbooks to pupils. This was started in 1945 and has been revised several times, the last review being in 1965. Certain new course materials were being tried in some pilot schools in the Seoul area.

As for the secondary (junior high school) stage, efforts have been made to teach science as an integrated subject. Sixty pilot schools are at present taking part in this programme. In Maroh 1969 the Introductory Physical Science project was started in twenty-two pilot schools.

Considerable work has been done at the upper secondary (senior high school) level. Curriculum materials of Biological Sciences Curriculum Study (BSCS) Chem Study, and Physical Science Study Committee (PSSC), are being used. These have been translated and adapted into the Korean language by the efforts of the Science Education Committee, Korea (SEC).

Tracing the history of reforms of science education, Dr. Shin explained that the Science Education Committee which was first started by Dr. Chung in 1958, has done considerable work initially in the improvement of science teaching at secondary level. It carried on for several years on its own with support from the College of Education and the Seoul National University. Later this committee was given official recognition by the Ministry of Education and a Science Education Council was formed. The core members of the SEC were from the original Science Education Committee. It has six sub-committees in Earth Science, Biology, Chemistry, Primary School Science, Mathematics and Physics. The College of Education of Seoul National University has been actively involved in promoting new ideas on science teaching since 1958 with the formation of the Science Education Study Committee (SESC). In the review of the curriculum and teaching materials university staff, teachers from schools, textbook specialists and subject supervisors were involved.

For the primary (elementary) level, sixty pilot schools out of a total of 5418 were trying out the Elementary Science Study (ESS) programme.

For the secondary (high school) level, translations and adaptations were done in the BSCS Green Version, the Chem Study, PSSC, the Earth Science Study Programme (ESCP) and were being used in 780 high schools including 360 vocational schools.

The courses in biology, chemistry, physics and earth science were being done in some cases in a parallel manner and in most other cases separately year by year. Some schools taught biology and earth science in the first year, and chemistry and physics in the second year.

In the pre-service training programme, the College of Education through its members of the Faculty of Science and Mathematics has been able to promote new ideas on teaching science and mathematics.

In the in-service training programme the SESC, the National Science Teachers' Association of Korea and the Ministry of Education with financial assistance from UNICEF were actively engaged in introducing new ideas and new course materials for teaching science. The construction of simple new basic science equipment was also being given due attention. It is to be noted that as a result of such efforts Korea is now able to manufacture almost all the basic equipment required for schools except for the more sophisticated equipment which has still to be imported.

Areas of possible cooperation between the Ministry of Education, the various Korean education agencies and committees promoting science/maths education and RECSAM.

Mr. J.E.B. Ambrose outlined the purpose of setting up SEAMEC and its field projects. He then explained in brief the objectives of RECSAM and its five year operational programme. In the discussion which followed it was agreed that the Korean SESC and RECSAM would keep in close touch with each other. The possibility of Korean participation (at their own expense) was also discussed. No definite decision was arrived at but it was agreed that various avenues of assistance for Korean participation through the UNESCO, Asia Foundation and other interested bodies would be explored by both parties. It was explained that consideration was being given to inviting the Korean Ministry of Education to nominate participants to take part in the proposed RECSAM regional workshop in primary (elementary) science to be held in July 1970.

11th April 1969

Visit to the Embassy of Malaysia: The RECSAM officials paid a courtesy call on His Excellency, the Ambassador of Malaysia, Enche Hashim b. Sultan and signed the Visitors' Book.

Visit to the Korean National Commission for UNESCO: A short meeting was held at the UNESCO Building in the office of the Secretary General of the Korean National Commission for UNESCO.

Present: Mr. Park Rotae, Secretary General
Mr. Won Chong Hoon, Director, Division of Programming
Dr. Chung Yun Tai, Chairman, S.E.S.C.
Mr. J.E.B. Ambrose, Chairman, Steering Committee, RECSAM
Mr. Chin Pin Seng, Malaysian delegate, " "
Mr. C. Ganasalingam, Programme Co-ordinator, "

There was a discussion on the possibility of UNESCO assistance to Korean participants in the proposed activities of RECSAM e.g. the proposed Regional Workshop on Primary (Elementary) Science. Mr. Won explained that the commission's budget was rather small and the UNESCO provision for Korean activities had already been budgetted for the next two years and hence any new item could only be included after 1970.

On our way to the airport Mr. Won explained the procedure regarding the UNESCO Coupon System. Because of the strict foreign exchange control any purchase of scientific equipment directly from outside sources could only be more easily made through the use of the coupon system.

Ministry of Education, Taiwan, Republic of China, 10th-11th April 1969.

A preliminary meeting to discuss a programme for the visit of RECSAM officials was held at the office of the Director of Elementary Education Republic of China.

Present: Mrs. Cheng Chu-Sheng Yeh, Director of Elementary Education
Mr. Tsan Shu Chien, Deputy Director of the Bureau of International Cultural and Educational Relations
Mr. J.E.B. Ambrose, Chairman, Steering Committee, RECSAM
Mr. Chin Pin Seng, Malaysian delegate " "
Mr. C. Ganasalingam, Project Coordinator, RECSAM

Mrs. Cheng very kindly arranged a comprehensive programme of visits as follows:-

Friday, 11th April

Visit 1: 8.30 a.m. to The National Taiwan Science Hall, Taipei.
Visit 2: 9.45 a.m. Taipei Municipal Teachers' College for Women, Taipei.
West Gate Primary (Elementary) School, Taipei (pilot school)
Tai Ping " " " " "
(for trying out curriculum materials in primary science)
Visit 3: 1.30 p.m. Taipei Municipal First Girls' High School
Visit 4: 2.30 p.m. Taiwan Normal University, Taipei, and its In-service Teacher Education Centre.
Visit 5: 4.00 p.m. Taiwan Provincial Elementary School Teachers' In-Service Science Education Centre, Pan Chiao, Taiwan.

Visit 1: The National Taiwan Science Hall: 41 Nan Hai Road, Taipei.

Dr. Tien Chang Mo, the Director, welcomed the RECSAM officials and explained the functions of the Science Hall. Its main objective is to stimulate and encourage science education in cooperation with industry. The Science Hall with its Steering Committee organised and held the 9th National Students' Science Exhibition which ended recently.

The 12-year national development programme for science education for Taiwan.

Dr. Tien outlined the twelve year programme that was launched in 1968 and which will end in 1980. The first four year plan called for the intensification and upgrading of the training of teachers, and a retraining programme enabling all teachers to better their qualifications in science. By this it was hoped to increase by 60% the qualifications of all high school teachers.

In the field of college and university education it was hoped to increase the output in all levels of science and engineering especially mechanical engineering. It also had plans to increase research work at graduate level in each university.

During each of the four year periods it was hoped to improve the teaching of science at all levels, elementary to secondary, by retraining of teachers holding weekly seminars and improve their practical experience. A scientific exhibition would be held each year. At the same time improvement in mathematics education would go hand in hand with science education. A new mathematics curriculum and improvement of teaching methods would be carried out. There are seminars in mathematics regularly five times a week at different centres.

The Normal University would be giving credits for achievement, thus ensuring useful participation by teachers during in-service courses and seminars.

The twelve year plan would be reviewed each year. Details of the plan were given in a booklet but translated copies would be made available soon.

Scientific Instrumentation and Documentation Centre Programme of the Science Hall.

This was launched in September 1968 and its main purpose was to classify and identify the availability of scientific instruments within the country in schools, universities and industry so as to make the best possible economical use of such instruments for national development. In this era of specialisation and the rapid accumulation of scientific knowledge it was impossible to keep abreast with the design specifications of new scientific instruments.

Film slides were shown to explain the above particular programme. The basic steps were as follows, taking as an example an AC microvolmeter:-

(i) Classification and code numbers were assigned according to its operational capabilities.

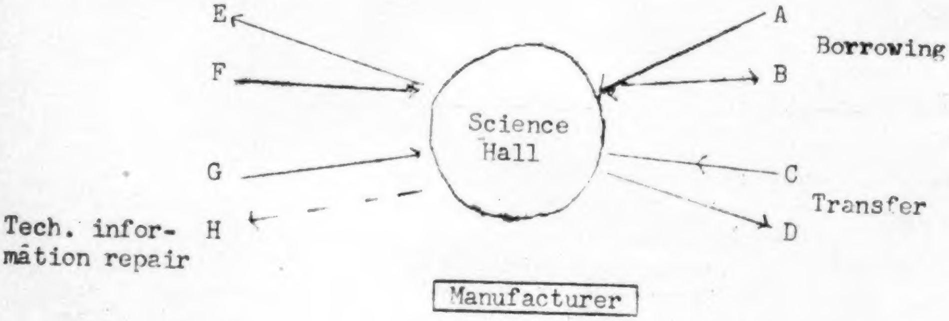
(ii) The detailed specifications of the instrument were written down in standard format.

(iii) Its usage in schools, universities, research and industry were then outlined giving tolerance factors for each use.

(iv) It was then catalogued in the scientific instrument stock list. More details were given when the cost of such an instrument was greater than US$500.00. This stock list was then distributed to all schools, universities, research organisations and industry. The classification is of a standard form as follows:

(a) Stock no. e.g. 04
(b) Code for materials used e.g. B C C
(c) Manufacturer and manufacturer's cat. no.
(d) spare parts
(e) repair facilities
(f) pooling of parts
(g) pooling of usage

One of the most important functions of the Science Hall in this instrumentation section is the co-ordinating function between users, borrowers and manufacturers, and also preventing a school, for instance, from buying an over-expensive or over-sophisticated instrument. The chart below shows this function:-



In the above chart the Science Hall coordinates (a) borrowing of a particular instrument by one institution, B, from A

(b) the temporary transfer between C and D

(c) exchange of one type of instrument with another, between E and F

(d) to assist and advise G in the suitable purchase of instruments

(e) gives technical information and help in the repair and maintenance of the instruments between manufacturer and user.

It was noted that there was a plan to set up a national maintenance equipment and repair centre to serve the users. At present there is a small maintenance equipment repair unit for such a purpose. The establishment of such a centre would be very useful to all developing countries as this is a key problem that would have to be overcome by such countries when effecting improvement in the teaching of science and technological subjects.

Visit 2: Taipei Municipal Teachers' College for Women:

The RECSAM officials were welcomed by the President Mrs. Nora Tze Hsiung Chu. This college is one of the nine training colleges responsible for the pre-service and in-service training of primary school teachers as well as general supervision of teaching in primary schools in Taiwan. She explained the role of the college in supervising and assisting 6000 teachers in 97 schools in the Greater Taipei district involving a student population of nearly a quarter of a million.

The role of the College is to

(i) train teachers for all primary schools

(ii) carry out in certain pilot schools studies and revision in curriculum improvement and teaching methods

(iii) study the use of science kits, such as 'Exploring Science', to adapt them to topics given in the present curriculum

(iv) hold new mathematics study seminars

(v) review the role of textbooks

(vi) assist teachers in improving their lessons

The College had 838 'day' students who are on scholarships provided by the Government and 489 'evening' students who are practising teachers and 300 summer school teachers who have to pay fees. The trainees could do electives during the last two years of their five year course. There are twenty-four clubs catering for out-of-college activities which helped to increase their usefulness as teachers. 'Day' students are required to serve five years with the Ministry of Education.

The budget of the college for this year is nine million yuan. It has 86 full time and 26 part time faculty members with 31 administrative staff.

Visit to two pilot schools trying out Primary/Elementary science curriculum materials:

(i) Hsi Men (West Gate) Elementary School, Taipei.

(ii) National School of Taipei, Taipei.

(i) RECSAM officials saw in the Hsi Men School a lesson on electricity where materials made by the teacher were being used to teach a simple electric circuit in the sixth grade. The enrolment of the class was 56 divided into 8 groups of seven pupils each.

In the second class simple materials like ballons, plastic strips (rulers) and confetti were used to carry out experiments in electrostatics in the 4th grade.

The children in both cases enjoyed doing the practical. In both cases it was noted that science specialists were attached to the school and carried out new science lessons in two special class rooms with a converted preparation room.

(ii) RECSAM officials saw in the National School of Taipei a fifth grade class using 'Exploring Science' kit on simple light experiments. There was an impressive collation of preserved biological specimens, some of which were brought by the children.

Visit 3: Taipei Municipal First Girls' High School

This is the biggest senior high school for girls in Taipei having 3785 day students (first shift) and 2206 afternoon (second shift) with a faculty staff of 237 and an administrative staff of 30.

In the 10th grade four hours per week are alloted to Biology, in the 11th grade five hours per week are alloted to Chemistry and in the 12th grade six hours per week are for Physics for science students. The other classes have three hours per week on a modified course in three science subjects for the three grades.

As for mathematics, trigonometry and geometry are done in 10th grade, algebra in 11th grade and Analytical Geometry in 12th grade.

This high school is one of the six pilot schools for science programmes in PSSC Physics, Chemistry Study and BSCS Biology and SMSG Mathameti It is also involved in helping the teaching of science and mathematics in the 60 high schools of the Northern District of Taiwan.

Later the RECSAM officials were shown round the schools, especially the Library and science laboratories. It was noted that a few of the PSSC items were made by the school staff for e.g. rheostats, switches, electroscopes, etc.

Visit 4: Taiwan Normal University, Taipei.

Section 1, East Hoping Road.

Present:	Dr. Hwang Chien Hou,	Dean of Studies
	Prof. Tom C.S. Kuo,	Director of the In-service Teachers Education Centre.
	Prof. S. Funamoto,	Colombo Plan Expert on Science Education from Japan.
	Mr. J.E.B. Ambrose,	Chairman, Steering Committee, RECSAM
	Mr. Chin Pin Seng,	Malaysian delegate, " "
	Mr. C. Ganasalingam,	Project Coordinator "

This is one of the universities for training teachers for secondary schools. It had 4769 students (full time) in 1967-1968 and 2297 part-time students in the evening session.

The university has

(i) a college of education with departments in education, social education, industrial education, physical education, health education and home economics.

(ii) a college of arts with departments in Chinese, English, History, Geography, Fine Arts and Music.

(iii) a college of science with departments in Biology, Chemistry, Physics, and Mathematics.

(iv) three research institutes in (a) education, awarding the degree of Master of Education (b) Chinese Literature, awarding degrees of M.A. and D. Litt. (c) English, awarding the degree of M. A.

Four types of courses are offered, the training division diploma course, the bachelor's degree course, the master's degree course in education, Chinese literature and English and the doctor's degree programme in the research institute of Chinese Literature. The bachelor's degree required four years of academic study and one year of full time supervised teaching in secondary schools.

Inservice Teachers' Education Centre of Taiwan Normal University: This centre was jointly established in 1958 by the Ministry of Education, the Provincial Department of Education, the Education Division of US/AID, UNESCO and the authorities of Taiwan Normal University.

It provides in-service training to practising teachers from junior and senior high schools. In the field of science education special emphasis is placed on adapting new ideas in Chemistry Study, PSSC Physics, SMSG (Maths), BSCS (Biology) to fit into the science curricula of senior high schools in Taiwan.

In 1967 an industrial arts project was started with the assistance of UNICEF to train five hundred industrial arts teachers and four hundred vocational guidance counsellors in order to improve industrial arts education in senior high schools. The project was scheduled to be completed in five years.

In view of the work going on at this centre, especially in the field of science and mathematics education, there are possible areas of close cooperation between this centre and RECSAM at secondary level because both centres have similar objectives.

Visit 5: Taiwan Provincial Elementary School Teachers' in-Service Education Centre, Pan Chiao, Taiwan.

This was established in May 1956 by the Provincial Dept. of Education. A five year cooperative programme for retraining elementary school teachers was started in 1963 with UNICEF assistance for about 12,000 participants. A new course for prospective principals and chief instructors of elementary schools was started in May 1965.

The aim of this centre is to enhance the qualifications of teachers by:

(i) cultivating the national spirit

(ii) strengthening the democratic and scientific approach to education

(iii) forming a correct attitude toward children and child education

(iv) improving teaching techniques and course materials

(v) uplifting the progressive and moral outlook

Particular emphasis is given in

(a) directing experience with special attention to instructional procedures

(b) reciprocal contribution between participants and supervisors

(c) learning by hearing, seeing, speaking, doing and thinking.

Selection of participants is based on the following principles:-

(i) Experienced and promising teachers who may develop as supervisors and be of assistance to other fellow teachers.

(ii) even distribution among cities and counties

(iii) teachers of pilot schools have priority over the others. This centre conducts several courses lasting from one to three weeks, and from one to three months, for about 130 to 240 resident participants.